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ABSTRACT

This report presents projections on areas of potential teacher shortage and oversupply in the next 10 years in North Carolina. The report is organized into five chapters. Following the introduction, chapter two presents data on past and projected levels of teacher demand. Chapter three presents data on past and projected levels of teacher supply from teacher education programs and from the reserve of certified teachers who are not presently employed by a North Carolina public school. Chapter four compares the independent projections of supply and demand and identifies teaching fields which are likely to experience shortages in the coming five years. The fifth chapter presents data on the changing composition of the teacher work force according to race, gender, age, degree level, and source of training. The final chapter offers conclusions and recommendations. The first appendix describes the certification areas which would allow a teacher to be counted as "in-field" for any given teaching assignment. Appendix B describes correspondence between PPAR (Professional Personnel Activity Report) teaching areas and CPC (Candidates for Public Certification) first choice certifications. (JD)

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TEACHER SUPPLY AND DEMAND IN NORTH CAROLINA PUBLIC SCHOOLS 1986–1995

Prepared for The University of North Carolina Task Force on the Preparation of Teachers

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TEACHER SUPPLY AND DEMAND
IN NORTH CAROLINA PUBLIC SCHOOLS
1986 - 1995

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Prepared for
The University of North Carolina
Task Force on the Preparation of Teachers

November 14, 1986

University of North Carolina-General Administration
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Despite the assistance of so many, the authors grudgingly claim responsibility for all errors and omissions.

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I. INTRODUCTION

The 1985 North Carolina General Assembly directed the Board of Governors of The University of North Carolina to establish a Task Force on the Preparation of Teachers. One of the five specific topics to be studied was "areas of potential teacher shortage and oversupply in the next 10 years". This report is presented in response to that charge.

No study of teacher supply and demand has been conducted in North Carolina since 1979-80, when the State Department of Public Instruction prepared the last state-level study of the topic. As part of the University's Teacher Education Review Program in 1977, Arthur Padilla prepared a report entitled The Teacher Market in North Carolina. Like similar studies conducted elsewhere, these studies forecast teacher surpluses for most of the late 1970's and/or early 1980's. Interest in the topic of teacher supply and demand has revived recently as increasing numbers of state-level, regional, and national studies forecast teacher shortages in the aggregate and in specific fields such as mathematics, sciences, computer science and various categories of special education. Examples of these studies are listed in the bibliography.

Like most of these studies, this one follows a manpower approach to the topic. This means that projections of supply and demand are done separately with no attempt to estimate salary levels needed to eliminate shortages or surpluses. The justification for such an approach is that the teacher labor market, unlike most labor markets in North Carolina, is one in

which salaries are set by state policy rather than by free market forces. In such an environment, the salary scale is only one of many state-level policy variables available to address teacher shortages and surpluses.

In 1985, the North Carolina General Assembly enacted legislation to adopt the Basic Education Program, a comprehensive proposal for expanding the basic curriculum offered to all North Carolina public school pupils. Among other things, the Basic Education Program will increase the number of state-funded teaching positions by almost 11,000 over an 8-year period concluding in 1992-93. More than 1500 of these positions have already been funded in the 1985-86 and 1986-87 school years. Once funding is complete, the teacher work force in North Carolina public schools will increase from its 1984-85 level of 56,563 to 66,705 in 1992-93. This 18 percent increase in the size of the teacher work force will put pressure on supply in the state.

The ability of North Carolina colleges and universities to meet this growing demand for teachers depends on many factors. The most important of these are teacher turnover rates, assumptions about enrollment growth, standards for admission to teacher education programs, the entry rate into teaching of newly graduated teacher education majors, standards for licensing new teachers, the number of new teachers immigrating from out-of-state to North Carolina, and the number of previously certified teachers who choose to begin or resume teaching in a North Carolina public school. These and other factors are considered

in the present study.

A proper interpretation of the data in this report requires that the reader be warned of several limitations of scope and focus. First, the supply and demand projections cover only North Carolina public schools. Private and out-of-state schools are ignored. Second, the projections exploit four data bases, each of which has a different set of categories for identifying teaching fields. Defining a common set of categories has required some aggregation of teaching fields that may not satisfy all readers. Third, the projections by teaching field are only five-year projections because of the doubtful accuracy of pushing such projections further into the future. Projections in the aggregate are ten-year projections. Fourth, projections of shortages are not done by geographic region. Finally, the projections should not be interpreted as predictions because their purpose is to help eliminate shortages and surpluses by calling attention to them before they materialize.

The report is organized into five chapters and two appendixes. Chapter II presents data on past and projected levels of teacher demand. Chapter III presents data on past and projected levels of teacher supply from teacher education programs and from the reserve of certified teachers who are not presently employed by a North Caroina public school. Chapter IV compares the independent projections of supply and demand and identifies teaching fields which are likely to experience shortages in the coming five years. Chapter V presents data on the changing composition of the teacher work force according to

race, gender, age, degree level and source of training. Chapter VI presents conclusions and recommendations.

II. TEACHER DEMAND

For this report, teacher demand is measured by the number of full-time equivalent (FTE) teaching positions needed to teach each subject in each grade range. If teacher demand and supply are to be in balance over time, then the change in the number of funded teaching positions, plus turnover (the number of teachers needed to replace those leaving North Carolina's public schools each year) must equal the number of qualified teachers seeking employment each year. This equality needs to hold for each grade range and for each teaching field. It is possible, for example, to have equality in overall teacher supply and demand, while having shortages or surpluses in particular grade ranges or in particular teaching fields, or in both.

Projections

To calculate projected surpluses or shortages by grade range and teaching field, demand figures must include projections of the total teaching staff and turnover, by grade range and by teaching field. Such projections have been prepared by the North Carolina Department of Public Instruction. Their projected teaching staff levels apply only to North Carolina public schools and are primarily calculated as a function of projected enrollment levels by grade range and subject taught, and of staffing levels called for by the Basic Education Program. Their projected turnover is calculated primarily as a function of teacher attributes such as age and experience, and of school

characteristics such as subject(s) taught, course load, class size, school location and employment opportunities outside teaching. The projections cover the five-year period 1986-87 through 1990-91. No projections are provided for the period 1991-92 through 1995-96. Thus, analyses of shortages and surpluses by teaching field must be confined to the coming five-year period. It is possible, however, to project the overall number of new teachers needed in the second five-year period in order to project overall shortages and surpluses. These calculations are based on the projections of enrollments in the North Carolina public schools and the implementation schedule for the Basic Education Program. Ten-year projections of teaching positions, turnover and new teachers needed are presented at the end of this chapter.

Enrollment Trends

Final Average Daily Membership (ADM) in the North Carolina public schools peaked in 1976-77, at 1,183,191. Since then it has decreased by 9.1 percent to 1,075,289 in 1985-86. By 1989-90 it is projected to bottom out at 1,063,252 and then to increase gradually to 1,098,096 by 1995-96. Table II-A presents data on these trends.

The projected decrease in enrollment between 1985-86 and 1990-91 does not imply that the number of teachers needed will decrease over this period. This is because enrollments in grades K-3 and 4-6, which are projected to increase during these years, are funded at lower student-teacher ratios than are enrollments in grades 7-8 and 9-12, which are projected to

TABLE II-A. FINAL AVERAGE DAILY MEMBERSHIP (ADM)
IN NORTH CAROLINA PUBLIC SCHOOLS, PAST
AND PRELIMINARY PROJECTIONS TO 1995-96

Year	GRADE K-3	4-6	7-8	9-12	TOTAL*
1976-77	350,976	268,013	201,968	355,718	1,183,191
1977-78	354,495	261,142	197,006	354,764	1,174,302
1978-79	350,775	260,209	186,768	351,167	1,155,501
1979-80	341,689	263,902	180,943	343,480	1,142,552
1980-81	328,403	269,418	178,289	334,889	1,123,840
1981-82	316,911	267,930	178,004	327,368	1,102,951
1982-83	315,249	260,096	183,058	321,822	1,092,930
1983-84	314,135	249,211	187,401	321,253	1,084,728
1984-85	316,731	241,967	183,428	323,851	1,078,700
1985-86	324,172	236,231	174,785	327,105	1,075,289
PROJECTED GROUP TOTAL (PRELIMINARY)					
1986-87	327,878	236,157	169,451	325,582	1,072,064
1987-88	333,810	237,250	165,898	320,681	1,070,635
1988-89	337,895	242,200	161,838	311,616	1,066,545
1989-90	340,329	245,315	163,352	301,260	1,063,252
1990-91	342,792	249,121	167,049	292,925	1,064,883
1991-92	343,081	253,635	168,150	291,730	1,069,592
1992-93	344,201	255,276	171,687	291,893	1,076,053
1993-94	344,832	257,078	174,259	294,283	1,083,448
1994-95	344,981	257,207	176,765	300,574	1,092,523
1995-96	345,228	257,927	178,016	303,929	1,098,096

*Includes exceptional children and the trainable mentally handicappedin the totals, but not in the grade level counts.
SOURCE: Planning and Research Division, State Department of Public Instruction, September 1986.

decrease during these years. In fact, based on 1985-86 funding ratios, the number of regular classroom teachers would change little over these five years. However, during the second five-year period, the number would increase by about three percent.

The Basic Education Program

Over the next seven years, the Basic Education Program, if fully funded in each year, will add more than 9400 state-funded classroom teaching positions to professional staffing levels in North Carolina's public schools. In 1985-86, the program added 1357 positions. Table II-B shows the planned implementation schedule for the Basic Education Program.

Positions will be added in order to expand the curriculum offered at each grade level and reduce class size. The maximum student-teacher allotment ratios will eventually be lowered from 26:1 to 20:1 in grades K-3, from 26:1 to 22:1 in grades 4-6, from 27.5:1 to 21:1 in grades 7-8, and from 31:1 to 24.5:1 in grades 9-12. The positions shown on the lines labeled "reduce class size" represent the positions needed to lower class size with no expansion of the curriculum. The positions shown on the lines labeled "expand program" represent the positions needed to expand the curriculum with no change in class size. On each line the number of positions needed is based on the projected enrollments in those years.

Federal and Locally Funded Positions

The Basic Education Program will require the state to take responsibility for funding some positions now funded by local school districts. This will occur as part of the effort to

TABLE II-B NEW CLASSROOM TEACHING POSITIONS TO BE FUNDED BY THE BASIC EDUCATION PROGRAM BY ACADEMIC YEAR

	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	TOTAL
Reduce Class Size Grades 7-9	1,357	205	0	0	0	0	0	0	1,562
Expand Program Grades 7-8	0	0	848	651	0	0	0	0	1,499
Expand Program Grades 4-6	0	0	770	462	664	0	0	0	1,896
Expand Program Grades K-3	0	0	0	532	561	547	548	0	2,188
Expand Program Grades 9-12	0	0	0	0	373	331	0	0	704
Reduce Class Size Grades 10-12	0	0	0	0	0	433	415	412	1,260
Reduce Class Size Grades K-3	0	0	0	0	0	0	840	845	1,685
TOTAL	1,357	205	1,618	1,645	1,598	1,311	1,803	1,257	10,794

SOURCE: State Department of Public Instruction, June 1986.

expand the basic curriculum offered at each grade level. It is reasonable to assume, therefore, that some locally funded positions will be eliminated as local units shift funding from teaching personnel to other priorities. The extent of this shifting has been estimated on the basis of the past relationship between state and local funding of professional positions and has been extrapolated for the coming years in building teacher demand projections in this report.

Federal funding of teaching positions is expected to decrease due to federal budget balancing efforts such as the Gramm-Rudman-Hollings Act of 1985. Such reductions have been forecast, and they too are factored into the projections of teacher demand in this report.

Projections of Teaching Staff

Table II-C presents data on the number of FTE teachers by field in North Carolina's public schools. The data cover the past years and, as projected, the next five years. A comparison of 1985-86 and 1990-91 data reveal that:

*5812 additional teachers will be needed by 1990-91, an increase of 10 percent over 1985-86.

*3549 additional elementary grade teachers will be needed by 1990-91, an increase of 16 percent over 1985-86.

*1318 additional middle and secondary grades teachers will be needed by 1990-91, an increase of 8 percent over 1985-86.

TABLE II-C. PAST AND PROJECTED NUMBER OF FTE TEACHERS IN NORTH CAROLINA PUBLIC SCHOOLS BY TEACHING FIELD

TEACHING FIELD	1981-82	1982-83	1983-84	1984-85	1985-86	PAST TOTAL	1986-87	1987-88	1988-89	1989-90	1990-91	PROJECTED TOTAL
ELEMENTARY												
K THRU 3	12863	12635	12619	12720	13001	63838	13156	13492	13970	14402	14741	69761
4 THRU 6	9266	9061	8806	9415	9344	45892	9361	9839	10382	10913	11153	51648
ELEMENTARY TOTAL	22129	21696	21425	22135	22345	109730	22517	23331	24352	25315	25894	121409
K-12 SUBJECT AREAS												
SPEECH	17	17	19	17	17	87	17	17	16	16	17	83
READING	2419	2167	2018	1926	1928	10458	1760	1657	1659	1659	1661	8396
MUSIC	1352	1379	1377	1400	1398	6906	1434	1471	1511	1565	1608	7589
ART	738	739	755	755	794	3781	790	811	838	864	898	4201
THEATER ARTS/DANCE/OTHER	44	55	119	132	140	490	145	147	148	148	151	739
HEALTH/PHYSICAL ED.	2736	2771	2807	2893	3034	14241	3029	3100	3169	3248	3339	15885
DRIVER EDUCATION	451	453	453	464	469	2290	485	504	507	508	519	2523
K-12 SUBJECT AREAS TOTAL	7757	7581	7548	7587	7780	38253	7660	7707	7848	8008	8193	39416
MIDDLE GRADES/SECONDARY (7-12)												
ENGLISH	4327	4335	4334	4423	4592	22011	4558	4678	4733	4798	4905	23672
MATH/COMPUTER ED.	3468	3428	3497	3603	3774	17770	3789	3879	3929	3978	4065	19640
SCIENCE												
BIOLOGY	788	790	766	780	794	3918	795	784	768	754	749	3850
CHEMISTRY	224	220	238	250	266	1198	276	287	295	305	318	1481
PHYSICS	77	77	80	90	90	414	96	100	105	107	113	521
GENERAL SCIENCE	1687	1706	1736	1741	1871	8741	1834	1922	1975	2037	2110	9878
SCIENCE TOTAL	2776	2793	2820	2861	3021	14271	3001	3093	3143	3203	3290	15730
SOCIAL STUDIES												
POLITICAL SCIENCE	153	163	569	645	658	2188	660	658	644	636	632	3230
GEOGRAPHY	76	71	66	52	47	312	49	50	48	45	43	235
HISTORY	1115	1125	797	781	947	4765	910	892	885	883	886	4456
ECONOMICS	43	37	57	51	50	238	61	67	72	75	78	353
SOCIOLOGY	77	71	61	58	42	309	44	42	40	36	35	197
GENERAL SOCIAL STUDIES	1358	1335	1330	1331	1369	6723	1323	1389	1415	1453	1493	7073
SOCIAL STUDIES TOTAL	2822	2802	2880	2918	3113	14535	3047	3098	3104	3128	3167	15544
FOREIGN LANGUAGE												
FRENCH	289	295	313	332	322	1551	342	349	351	357	361	1760
SPANISH	322	326	346	374	401	1769	402	413	422	429	445	2111
GERMAN	26	25	22	25	30	128	27	28	27	27	28	137
LATIN	50	54	57	60	56	277	62	69	74	78	83	366
OTHER FOREIGN LANGUAGE	68	62	66	60	55	311	63	65	68	72	77	345
FOREIGN LANGUAGE TOTAL	755	762	804	851	864	4036	896	924	942	963	994	4719
OTHER MIDDLE GRADES/SECONDARY	473	437	429	448	630	2417	710	819	854	871	891	4145
MIDDLE GRADES/SECONDARY TOTAL	14621	14557	14764	15104	15994	75040	16001	16491	16705	16941	17312	83450
VOCATIONAL EDUCATION												
AGRICULTURE	389	371	367	355	348	1830	335	320	301	290	280	1526
BUSINESS EDUCATION	1208	1209	1258	1291	1297	6263	1295	1287	1263	1271	1283	6399
HOME ECONOMICS	874	879	876	855	851	4335	824	796	759	742	724	3845
MARKETING/DIST. ED.	183	184	185	185	186	923	183	182	176	175	174	890
TRADE & INDUSTRY	1245	1214	1213	1215	1120	6007	1136	1094	1042	1014	990	5276
HEALTH OCCUPATIONS	145	148	152	148	150	743	155	153	152	153	154	767
PRE-VOCATIONAL	726	727	705	688	689	3535	665	654	648	666	664	3297
INDUSTRIAL ARTS	253	268	287	297	318	1423	329	335	338	343	353	1698
VOCATIONAL HANDICAPPED	224	216	204	225	202	1071	228	241	248	254	261	1232
OTHER VOCATIONAL	13	14	8	26	36	97	23	25	25	24	24	121
ROTC	163	164	188	186	187	888	188	191	193	199	211	982
VOCATIONAL EDUCATION TOTAL	5423	5394	5443	5471	5384	27115	5361	5278	5145	5131	5118	26033
EXCEPTIONAL CHILDREN												
MENTALLY HANDICAPPED	2429	2245	2197	1977	1609	10457	1442	1476	1462	1292	1179	6851
SPEECH IMPAIRED	557	583	599	618	613	2970	600	640	704	719	741	3404
ACADEMICALLY GIFTED	773	808	786	838	852	4057	848	925	1021	1054	1105	4953
EMOTIONALLY HANDICAPPED	314	338	393	434	425	1904	400	411	451	467	467	2196
HOMEBOUND/HOSPITALIZED	72	62	81	92	87	394	74	68	72	66	61	341
LEARNING DISABLED	1464	1582	1693	1898	1575	8212	1576	1711	1811	1813	1810	8721
PHYSICALLY HANDICAPPED	56	76	62	70	64	328	58	60	64	64	63	309
HEARING IMPAIRED	96	95	96	100	106	493	99	97	106	110	112	524
VISUALLY IMPAIRED	17	16	22	23	27	105	23	28	34	41	52	178
OTHER EXCEPTIONALITIES	187	196	187	206	972	1748	1140	1340	1503	1552	1538	7073
EXCEPTIONAL CHILDREN TOTAL	5965	6001	6116	6256	6330	30668	6260	6756	7228	7178	7128	34550
TOTAL	55895	55229	55296	56553	57833	280806	57799	59563	61278	62573	63645	304858

SOURCE: State Department of Public Instruction, August 1986.

*266 fewer vocational education teachers will be needed by 1990-91, a decrease of 5 percent since 1985-86.

*798 additional teachers of exceptional children will be needed by 1990-91, an increase of 12.6 percent over 1985-86.

These comparisons show that growth in elementary grade teaching positions will account for 61 percent of the total projected growth in teaching positions over the next five years. Specific teaching fields in which position growth will be above average are: reading (15%), art (13%), chemistry (20%), physics (26%), general science (13%), economics (56%), French (12%), Spanish (11%), Latin (48%), industrial arts (11%), vocational handicapped (29%), ROTC (13%), speech impaired (21%), academically gifted (30%), learning disabled (15%), and visually impaired (93%). The reader should note that curriculum changes sometimes caused marked changes in the counts of teachers in certain fields. For example, the number of history teachers decreased from 1125 to 797 between 1982-83 and 1983-84, while the number of political science teachers increased from 163 to 569 in response to the substitution of a course entitled, "Economic, Legal and Political Systems in Action" for North Carolina history and U.S. history in 1983-84.

Teacher Turnover

In this report, teacher turnover is based on a fall-to-fall count of the number of teachers who cease working in any school system in North Carolina. Teachers who move from one North Carolina school to another, or from one North Carolina school

district to another, are not counted as turnover. Similarly, teachers who move into non-teaching positions, within schools or school districts, are not counted since they are largely offset by non-teaching professional staff who move into teaching, within schools or school districts. To the extent that movement from teaching to non-teaching is not offset by movement from non-teaching to teaching, the number of new positions will not exactly equal the sum of additional positions plus measured turnover. Discrepancies caused by this problem are negligible and insignificant.

Teacher turnover was the primary source of vacancies in North Carolina's public schools in the period 1980-81 through 1984-85. It accounted for 21,705, or 94 percent, of the 23,193 teacher vacancies filled in those years. In the coming five years, teacher turnover is projected to account for 24,310, or 81 percent of the 30,129 vacancies needed to be filled in these years. Thus, teacher turnover remains the dominant source of vacancies even in a time when the number of teaching positions is expected to grow by about two percent per year.

Table II-D presents data on the number of teachers leaving their positions over the past five years and on the number of teachers projected to leave their positions during the coming five years. The projected number of leavers in each field was calculated by applying projected turnover rates to the projected number of teachers in that field. Thus, the projected vacancies due to turnover in year $\underline{t}$ is calculated as the product of the projected turnover rate in year $\underline{t}$-1 and the projected number of

TABLE II-D. PAST AND PROJECTED NUMBER OF FTE TEACHERS LEAVING NORTH CAROLINA PUBLIC SCHOOLS BY TEACHING FIELD

TEACHING FIELD	1980-81	1981-82	1982-83	1983-84	1984-85	PAST TOTAL	1985-86	1986-87	1987-88	1988-89	1989-90	PROJECTED TOTAL
ELEMENTARY												
K THRU 3	1077	858	788	685	726	4134	897	885	932	1105	1142	4961
4 THRU 6	762	662	622	498	552	3096	657	644	716	874	936	3827
ELEMENTARY TOTAL	1839	1520	1410	1183	1278	7230	1554	1529	1648	1979	2078	8788
K-12 SUBJECT AREAS												
SPEECH	2	1	1	2	1	7	1	1	1	1	1	5
READING	289	209	198	117	145	958	153	137	126	144	147	707
MUSIC	187	157	160	121	143	768	126	131	138	155	159	709
ART	90	94	75	68	64	391	70	72	77	90	96	405
THEATER ARTS/DANCE/OTHER	5	9	9	8	17	48	14	15	17	18	19	83
HEALTH/PHYSICAL ED.	199	182	161	154	154	850	211	201	211	246	252	1121
DRIVER EDUCATION	28	27	26	25	28	134	28	30	31	36	35	160
K-12 SUBJECT AREAS TOTAL	800	679	630	495	552	3156	603	587	601	690	709	3190
MIDDLE GRADES/SECONDARY (7-12)												
ENGLISH	404	343	344	292	308	1691	353	342	363	415	421	1894
MATH/COMPUTER ED.	300	277	286	263	262	1388	301	293	308	353	360	1615
SCIENCE												
BIOLOGY	70	56	53	45	61	285	60	59	60	67	67	313
CHEMISTRY	21	21	22	20	16	100	22	23	25	29	32	131
PHYSICS	8	8	7	9	3	35	7	8	9	11	12	47
GENERAL SCIENCE	131	129	131	139	145	675	151	141	155	181	190	818
SCIENCE TOTAL	230	214	213	213	225	1095	240	231	249	288	301	1309
SOCIAL STUDIES												
POLITICAL SCIENCE	9	15	11	33	39	107	50	49	51	56	58	264
GEOGRAPHY	5	4	4	4	3	20	3	4	4	4	4	19
HISTORY	86	71	76	52	44	329	68	63	63	72	73	339
ECONOMICS	4	1	2	1	3	11	4	5	5	6	6	26
SOCIOLOGY	7	3	3	3	3	19	3	3	3	3	2	14
GENERAL SOCIAL STUDIES	93	102	91	87	74	447	101	93	105	121	127	547
SOCIAL STUDIES TOTAL	204	196	187	180	166	933	229	217	231	262	270	1209
FOREIGN LANGUAGE												
FRENCH	30	21	30	32	35	148	26	30	33	37	40	166
SPANISH	45	29	26	36	37	173	35	36	40	46	52	209
GERMAN	3	2	3	1	2	11	3	3	3	3	4	16
LATIN	6	2	5	10	12	35	6	8	9	11	11	45
OTHER FOREIGN LANGUAGE	9	7	8	9	8	41	5	6	7	8	9	35
FOREIGN LANGUAGE TOTAL	93	61	72	88	94	408	75	83	92	105	116	471
OTHER MIDDLE GRADES/SECONDARY	54	56	47	37	44	238	57	66	82	82	89	376
MIDDLE GRADES/SECONDARY TOTAL	1285	1147	1149	1073	1099	5753	1255	1232	1325	1505	1557	6874
VOCATIONAL EDUCATION												
AGRICULTURE	45	51	36	33	33	198	26	26	24	25	25	126
BUSINESS EDUCATION	69	70	74	70	88	371	79	83	84	94	96	436
HOME ECONOMICS	68	64	88	61	75	356	58	58	57	61	60	294
MARKETING/DIST. ED.	11	17	19	17	15	79	14	14	14	15	15	72
TRADE & INDUSTRY	114	114	96	112	114	550	75	81	79	84	82	401
HEALTH OCCUPATIONS	17	16	10	16	14	73	11	12	12	13	13	61
PRE-VOCATIONAL	64	57	47	56	55	279	48	47	47	53	56	251
INDUSTRIAL ARTS	32	16	19	33	30	130	25	27	27	29	29	137
VOCATIONAL HANDICAPPED	26	15	16	15	16	88	15	19	20	22	21	97
OTHER VOCATIONAL	2	2	1	2	1	8	3	2	2	3	3	13
ROTC	18	16	18	23	34	109	28	30	30	31	32	151
VOCATIONAL EDUCATION TOTAL	466	438	424	438	475	2241	382	399	396	430	432	2039
EXCEPTIONAL CHILDREN												
MENTALLY HANDICAPPED	290	241	211	195	154	1091	134	111	118	128	123	614
SPEECH IMPAIRED	88	93	81	81	85	428	71	72	78	90	89	400
ACADEMICALLY GIFTED	77	69	73	52	63	334	68	68	87	116	120	459
EMOTIONALLY HANDICAPPED	68	55	45	55	54	277	51	46	46	54	54	251
HOMEBOUND/HOSPITALIZED	24	17	7	6	8	62	8	7	6	7	6	34
LEARNING DISABLED	191	171	148	159	195	864	140	140	160	186	181	807
PHYSICALLY HANDICAPPED	9	6	9	6	10	40	6	5	6	7	7	31
HEARING IMPAIRED	20	13	15	17	14	79	13	12	12	14	14	65
VISUALLY IMPAIRED	7	3	0	3	1	14	3	2	3	4	5	17
OTHER EXCEPTIONALITIES	24	35	25	29	23	136	95	124	153	183	186	741
EXCEPTIONAL CHILDREN TOTAL	798	703	614	603	607	3325	589	587	669	789	785	3419
TOTAL	5188	4487	4227	3792	4011	21705	4383	4334	4639	5393	5561	24310

SOURCE: State Department of Public Instruction, August 1986.

teachers in year t-1.

Calculating Turnover

The procedure for projecting turnover rates was somewhat complicated. First, a statistical model of turnover was fitted to data on individual teachers employed since 1978-79. The model predicted the probability that the teacher would leave in a given year based on teacher attributes, school characteristics, and variables describing the local economy in that year. By means of simulation, the model was used to predict the number of teachers leaving in 1986-87, and then the model was rerun for the next year under the assumption that replacement teachers possessed attributes which were randomly chosen from among those of the previous year's new hires. The process was repeated for each successive year in the projection period.

Past and projected trends in turnover rates are presented in Table II-E. The turnover rates for 1985-86 are projected because turnover cannot be determined until data on the 1986-87 work force are available. The projected rates stop at 1989-90 because they are the rates needed to forecast vacancies due to turnover in 1990-91.

Projected Teacher Turnover

The overall pattern of turnover rates shows that they have decreased over the past four years but are projected to increase over the coming five years. The primary reason for the reversal of trends is that in the coming years an increasing fraction of the teacher work force will be young and inexperienced and these teachers typically have higher turnover rates.

TABLE II-E. PAST AND PROJECTED TURNOVER RATES FOR FTE TEACHERS IN NORTH CAROLINA PUBLIC SCHOOLS BY TEACHING FIELD

	PAST TURNOVER RATES				PROJECTED TURNOVER RATES				
TEACHING FIELD	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90
ELEMENTARY									
K THRU 3	6.67%	6.24%	5.43%	5.71%	6.90%	6.73%	6.91%	7.91%	7.93%
4 THRU 6	7.14%	6.86%	5.66%	5.86%	7.03%	6.88%	7.28%	8.42%	8.58%
ELEMENTARY TOTAL	6.87%	6.50%	5.52%	5.77%	6.95%	6.79%	7.06%	8.13%	8.21%
K-12 SUBJECT AREAS									
SPEECH	5.88%	5.88%	10.53%	5.88%	5.88%	5.88%	5.88%	6.25%	6.25%
READING	8.64%	9.14%	5.80%	7.53%	7.94%	7.78%	7.60%	8.68%	8.86%
MUSIC	11.61%	11.60%	8.79%	10.21%	9.01%	9.14%	9.38%	10.26%	10.16%
ART	12.74%	10.15%	9.01%	8.48%	8.82%	9.11%	9.49%	10.74%	11.11%
THEATER ARTS/DANCE/OTHER	20.45%	16.36%	6.72%	12.88%	10.00%	10.34%	11.56%	12.16%	12.84%
HEALTH/PHYSICAL ED.	6.65%	5.81%	5.49%	5.32%	6.95%	6.64%	6.81%	7.76%	7.76%
DRIVER EDUCATION	5.99%	5.74%	5.52%	6.03%	5.97%	6.19%	6.15%	7.10%	6.89%
K-12 SUBJECT AREAS TOTAL	8.75%	8.31%	6.56%	7.28%	7.75%	7.66%	7.80%	8.79%	8.85%
MIDDLE GRADES/SECONDARY (7-12)									
ENGLISH	7.93%	7.94%	6.74%	6.96%	7.69%	7.50%	7.76%	8.77%	8.77%
MATH/COMPUTER ED.	7.99%	8.34%	7.52%	7.27%	7.98%	7.73%	7.94%	8.98%	9.05%
SCIENCE									
BIOLOGY	7.11%	6.71%	5.87%	7.82%	7.56%	7.42%	7.65%	8.72%	8.89%
CHEMISTRY	9.38%	10.00%	8.40%	6.40%	8.27%	8.33%	8.71%	9.83%	10.49%
PHYSICS	10.39%	9.09%	11.25%	3.33%	7.78%	8.33%	9.00%	10.48%	11.21%
GENERAL SCIENCE	7.65%	7.68%	8.01%	8.33%	8.07%	7.69%	8.06%	9.16%	9.33%
SCIENCE TOTAL	7.71%	7.63%	7.55%	7.86%	7.94%	7.70%	8.05%	9.16%	9.40%
SOCIAL STUDIES									
POLITICAL SCIENCE	9.80%	6.75%	5.80%	6.05%	7.60%	7.42%	7.75%	8.70%	9.12%
GEOGRAPHY	5.26%	5.63%	6.06%	5.77%	6.38%	8.16%	8.00%	8.33%	8.89%
HISTORY	6.37%	6.76%	6.52%	5.63%	7.18%	6.92%	7.06%	8.14%	8.27%
ECONOMICS	2.33%	5.41%	1.75%	5.88%	8.00%	8.20%	7.46%	8.33%	8.00%
SOCIOLOGY	3.90%	4.23%	4.92%	5.17%	7.14%	6.82%	7.14%	7.50%	5.56%
GENERAL SOCIAL STUDIES	7.51%	6.82%	6.54%	5.56%	7.38%	7.03%	7.56%	8.55%	8.74%
SOCIAL STUDIES TOTAL	6.95%	6.67%	6.25%	5.69%	7.36%	7.12%	7.46%	8.44%	8.63%
FOREIGN LANGUAGE									
FRENCH	7.27%	10.17%	10.22%	10.54%	8.07%	8.77%	9.46%	10.54%	11.20%
SPANISH	9.01%	7.98%	10.40%	9.89%	8.73%	8.96%	9.69%	10.90%	12.12%
GERMAN	7.69%	12.00%	4.55%	8.00%	10.00%	11.11%	10.71%	11.11%	14.81%
LATIN	4.00%	9.26%	17.54%	20.00%	10.71%	12.90%	13.04%	14.86%	14.10%
OTHER FOREIGN LANGUAGE	10.29%	12.90%	13.64%	13.33%	9.09%	9.52%	10.77%	11.76%	12.50%
FOREIGN LANGUAGE TOTAL	8.08%	9.45%	10.95%	11.05%	8.68%	9.26%	9.96%	11.15%	12.05%
OTHER MIDDLE GRADES/SECONDARY	11.84%	10.76%	8.62%	9.82%	9.05%	9.30%	10.01%	9.60%	10.22%
MIDDLE GRADES/SECONDARY TOTAL	7.84%	7.89%	7.27%	7.28%	7.85%	7.70%	8.03%	9.01%	9.19%
VOCATIONAL EDUCATION									
AGRICULTURE	13.11%	9.70%	8.99%	9.30%	7.47%	7.76%	7.50%	8.31%	8.62%
BUSINESS EDUCATION	5.79%	6.12%	5.56%	6.82%	6.09%	6.41%	6.53%	7.44%	7.55%
HOME ECONOMICS	7.32%	10.01%	6.96%	8.77%	6.82%	7.04%	7.16%	8.04%	8.09%
MARKETING/DIST. ED.	9.29%	10.33%	9.19%	8.11%	7.53%	7.65%	7.69%	8.52%	8.57%
TRADE & INDUSTRY	9.16%	7.91%	9.23%	9.38%	6.70%	7.13%	7.22%	8.06%	8.09%
HEALTH OCCUPATIONS	11.03%	6.76%	10.53%	9.46%	7.33%	7.74%	7.84%	8.55%	8.50%
PRE-VOCATIONAL	7.85%	6.46%	7.94%	7.99%	6.97%	7.07%	7.19%	8.18%	8.41%
INDUSTRIAL ARTS	6.32%	7.09%	11.50%	10.10%	7.86%	8.21%	8.06%	8.58%	8.45%
VOCATIONAL HANDICAPPED	6.70%	7.41%	7.35%	7.11%	7.43%	8.33%	8.30%	8.87%	8.27%
OTHER VOCATIONAL	15.38%	7.14%	25.00%	3.85%	8.33%	8.70%	8.00%	12.00%	12.50%
ROTC	9.82%	10.98%	12.23%	18.28%	14.97%	15.96%	15.71%	16.06%	16.08%
VOCATIONAL EDUCATION TOTAL	8.08%	7.86%	8.05%	8.68%	7.10%	7.44%	7.50%	8.36%	8.42%
EXCEPTIONAL CHILDREN									
MENTALLY HANDICAPPED	9.92%	9.40%	8.88%	7.79%	8.33%	7.70%	7.99%	8.76%	9.52%
SPEECH IMPAIRED	16.70%	13.89%	13.52%	13.75%	11.58%	12.00%	12.19%	12.78%	12.38%
ACADEMICALLY GIFTED	8.93%	9.03%	6.62%	7.52%	7.98%	8.02%	9.41%	11.36%	11.39%
EMOTIONALLY HANDICAPPED	17.52%	13.31%	13.99%	12.44%	12.00%	11.50%	11.19%	11.97%	11.56%
HOMEBOUND/HOSPITALIZED	23.61%	11.29%	7.41%	8.70%	9.20%	9.46%	8.82%	9.72%	9.09%
LEARNING DISABLED	11.68%	9.36%	9.39%	10.27%	8.89%	8.88%	9.35%	10.27%	9.98%
PHYSICALLY HANDICAPPED	10.71%	11.84%	9.68%	14.29%	9.38%	8.62%	10.00%	10.94%	10.94%
HEARING IMPAIRED	13.54%	15.79%	17.71%	14.00%	12.26%	12.12%	12.37%	13.21%	12.73%
VISUALLY IMPAIRED	17.65%	0.00%	13.64%	4.35%	11.11%	8.70%	10.71%	11.76%	12.20%
OTHER EXCEPTIONALITIES	18.72%	12.76%	15.51%	11.17%	9.77%	10.88%	11.42%	12.18%	11.98%
EXCEPTIONAL CHILDREN TOTAL	11.79%	10.23%	9.86%	9.70%	9.30%	9.38%	9.90%	10.92%	10.94%
TOTAL	8.03%	7.65%	6.86%	7.09%	7.58%	7.50%	7.79%	8.80%	8.89%

SOURCE: State Department of Public Instruction, August 1986.

The projected increase in turnover rates is a significant source of new teacher vacancies. At the 1985-86 level of staffing, the increase from 7.58 percent in 1985-86 to 8.89 percent in 1989-90 accounts for 758 (or 14%) of the projected new vacancies in 1990-91. The link between the Basic Education Program and turnover rates means that any adjustment to the funding schedule for the Basic Education Program will have both a direct and an indirect effect on projected teacher vacancies. The direct effect is the result of program expansion and class size reduction, and the indirect effect is the result of the induced increase in turnover rates.

New Hires

Table II-F presents data on the number of new hires for each teaching field. Data for each of the past five years are actual counts; data for each of the coming five years are derived from projections of turnover and staffing levels. The data show that the total number of new hires in the coming five years is projected to be 30,129, which is 30 percent higher than the 23,193 new hires in the past five years. A comparison of data for the two five-year periods shows that there are several notable changes in the composition of new hires. The percentage of new hires in elementary grades increases from 30 to 41 percent while the percentage in middle and secondary grades decreases from 30 to 27 percent. In vocational education, it decreases from 9 to 6 percent and in exceptional education, from 16 to 14 percent. These percentages could be altered somewhat by changes in the implementation schedule for the Basic Education Program,

TABLE II-F. PAST AND PROJECTED NUMBER OF NEWLY HIRED FTE TEACHERS IN NORTH CAROLINA PUBLIC SCHOOLS BY TEACHING FIELD

TEACHING FIELD	1981-82	1982-83	1983-84	1984-85	1985-86	PAST TOTAL	1986-87	1987-88	1988-89	1989-90	1990-91	PROJECTED TOTAL
ELEMENTARY												
K THRU 3	564	587	717	873	913	3654	1054	1222	1410	1537	1481	6704
4 THRU 6	538	462	524	921	746	3191	674	1122	1259	1406	1176	5637
ELEMENTARY TOTAL	1102	1049	1241	1794	1659	6845	1728	2344	2669	2943	2657	12341
K-12 SUBJECT AREAS												
SPEECH	2	1	1	1	2	7	1	1	0	1	2	5
READING	189	165	197	193	205	949	-15	33	128	144	149	439
MUSIC	148	183	168	149	171	819	162	169	178	209	202	920
ART	82	84	100	80	80	426	66	92	103	116	131	508
THEATER ARTS/DANCE/OTHER	9	13	15	19	21	77	19	17	17	18	22	93
HEALTH/PHYSICAL ED.	195	188	218	236	275	1112	206	273	279	326	342	1426
DRIVER EDUCATION	26	15	23	17	15	96	44	49	34	37	46	210
K-12 SUBJECT AREAS TOTAL	651	649	722	695	769	3486	483	634	739	851	894	3601
MIDDLE GRADES/SECONDARY (7-12)												
ENGLISH	350	289	337	385	472	1833	319	463	418	480	528	2208
MATH/COMPUTER ED.	304	251	369	399	459	1782	316	384	356	402	446	1904
SCIENCE												
BIOLOGY	55	48	61	79	82	325	61	48	44	53	62	268
CHEMISTRY	15	14	23	23	25	100	32	34	33	39	45	183
PHYSICS	3	4	8	9	8	32	13	12	14	13	18	70
GENERAL SCIENCE	126	139	180	205	263	913	114	229	207	243	263	1056
SCIENCE TOTAL	199	205	272	316	378	1370	220	323	298	348	388	1577
SOCIAL STUDIES												
POLITICAL SCIENCE	5	7	40	55	83	190	52	47	37	48	54	238
GEOGRAPHY	1	2	7	3	4	17	5	5	2	1	2	15
HISTORY	56	62	43	59	78	298	31	45	56	70	76	278
ECONOMICS	2	1	4	3	9	19	15	11	10	9	9	54
SOCIOLOGY	5	1	1	3	3	13	5	1	1	-1	1	7
GENERAL SOCIAL STUDIES	86	84	94	108	157	529	55	159	131	159	166	670
SOCIAL STUDIES TOTAL	155	157	189	231	334	1066	163	268	237	286	308	1262
FOREIGN LANGUAGE												
FRENCH	20	18	31	38	27	134	46	37	35	43	44	205
SPANISH	32	23	31	51	58	195	36	48	49	53	65	251
GERMAN	1	3	1	3	6	14	0	4	2	3	5	14
LATIN	5	5	9	11	11	41	12	15	14	15	16	72
OTHER FOREIGN LANGUAGE	9	9	11	9	12	50	14	9	10	12	13	58
FOREIGN LANGUAGE TOTAL	67	58	83	112	114	434	108	113	110	126	143	600
OTHER MIDDLE GRADES/SECONDARY	72	54	78	70	180	454	137	176	117	108	108	646
MIDDLE GRADES/SECONDARY TOTAL	1147	1014	1328	1513	1937	6939	1263	1727	1536	1750	1921	8197
VOCATIONAL EDUCATION												
AGRICULTURE	34	32	20	25	24	135	13	11	5	14	15	58
BUSINESS EDUCATION	62	55	89	78	86	370	77	75	60	102	108	422
HOME ECONOMICS	61	46	58	44	50	259	31	30	20	44	42	167
MARKETING/DIST. ED.	15	15	18	16	15	79	11	13	8	14	14	60
TRADE & INDUSTRY	102	86	82	111	75	456	91	39	27	56	58	271
HEALTH OCCUPATIONS	18	17	13	14	16	78	16	10	11	14	14	65
PRE-VOCATIONAL	60	69	74	69	61	333	24	36	41	71	54	226
INDUSTRIAL ARTS	31	26	32	37	38	164	36	33	30	34	39	172
VOCATIONAL HANDICAPPED	24	18	21	27	14	104	41	32	27	28	28	156
OTHER VOCATIONAL	1	2	2	11	8	24	-10	4	2	2	3	1
ROTC	37	19	42	20	37	155	29	33	32	37	44	175
VOCATIONAL EDUCATION TOTAL	445	385	451	452	424	2157	359	316	263	416	419	1773
EXCEPTIONAL CHILDREN												
MENTALLY HANDICAPPED	271	210	224	208	148	1061	-33	145	104	-42	10	184
SPEECH IMPAIRED	85	106	109	105	84	489	58	112	142	105	111	528
ACADEMICALLY GIFTED	57	66	69	90	73	355	64	145	183	149	171	712
EMOTIONALLY HANDICAPPED	68	84	90	91	88	421	26	57	86	70	54	293
HOMEBOUND/HOSPITALIZED	8	13	25	8	4	58	-5	1	10	1	1	8
LEARNING DISABLED	184	165	207	223	156	935	141	275	260	188	178	1042
PHYSICALLY HANDICAPPED	3	20	6	5	12	46	0	7	10	7	6	30
HEARING IMPAIRED	26	18	14	23	22	103	6	10	21	18	16	71
VISUALLY IMPAIRED	2	4	7	4	4	21	-1	7	9	11	16	42
OTHER EXCEPTIONALITIES	32	35	31	45	134	277	263	324	316	232	172	1307
EXCEPTIONAL CHILDREN TOTAL	736	721	782	802	725	3766	519	1083	1141	739	735	4217
TOTAL	4081	3818	4524	5256	5514	23193	4352	6104	6348	6699	6626	30129

SOURCE: State Department of Public Instruction, August 1986.

but the basic pattern is determined primarily by the projected changes in enrollment composition and government funding patterns.

Summary

Table II-G summarizes the number of FTE teachers, previous year turnover, and the number of new hires projected for the coming decade. Projections for the period 1991-92 through 1995-96 are based on the assumptions that: 1) the Basic Education Program is completed on schedule in 1992-93; 2) the enrollment projections in Table II-A are correct; and 3) the turnover rate stabilizes at 8 percent over this 5-year period. The projections indicate that new teacher demand will be greatest in the years 1989-90 through 1992-93. The decrease after 1992-93 is due to the completion of the Basic Education Program.

Table II-G. FTE Teachers, Turnover and New Hires

Year	FTE Teachers	Previous Year Turnover	New Hires
1986-87	57,799	4,383	4,352
1987-88	59,563	4,334	6,104
1988-89	61,278	4,639	6,348
1989-90	62,573	5,393	6,699
1990-91	63,645	5,561	6,626
1991-92	65,448	5,092	6,895
1992-93	66,705	5,236	6,493
1993-94	67,139	5,336	5,770
1994-95	67,139	5,371	5,859
1995-96	67,969	5,410	5,752

NOTE: New hires may not equal the sum of turnover plus additional FTE teachers due to rounding.

III. TEACHER SUPPLY

All public school teachers in North Carolina, except a few who teach vocational education courses, are required to hold at least a bachelor's degree from a regionally accredited college or university in order to be certified by the State. This means that the potential supply of new teachers in North Carolina is best measured by counting students who complete teacher education programs each year in North Carolina's colleges and universities. However, they do not constitute the majority of those newly hired by North Carolina's public schools each year. The majority of new hires, 81 percent, are teachers who did not graduate from a North Carolina college or university during the previous year. Yet, 85 percent of North Carolina's public school teachers in 1985-86 received at least one of their degrees from a North Carolina institution. What accounts for these statistics?

Entry into public school teaching has several origins. While some people go directly from earning the bachelor's degree into the classroom, others first teach in a private school or out-of-state school, or attend graduate school, or even take a non-teaching job. Many interrupt teaching to rear children, or to accompany a spouse to a new location. Still others enter teaching in midlife for the first time. Whatever path is followed into the classroom, it is clear that most North Carolina public school teachers take some degree-credit course work from a North Carolina college or university in order to learn or

strengthen teaching skills, but not all graduates of teacher education programs go directly into teaching. How can such a complex pattern of entry be adequately simplified so that estimates can be made of future teacher supply?

The approach taken in this report is to look at both the supply of new teachers from North Carolina's colleges and universities and the stock of existing certified persons who are not currently employed in a North Carolina public school. Both sources of supply can be analyzed by teaching field, although the methods for grouping and their interpretations differ.

Limitations of Using Degrees Conferred Data as a Measure of New Supply

The traditional measure of potential new supply has been the number of degrees conferred annually in the subdisciplines of education, such as elementary education, health and physical education, science education, and special education.

Unfortunately, this measure suffers from several limitations. First, some degree counts include graduates in programs with curriculum "tracks" or "concentrations" that train students for careers other than teaching. For example, consider students earning degrees in industrial arts, vocational, and technical education. These students often follow a curriculum focused on industrial technology, industrial distribution, manufacturing technology, or teaching at the two-year college level, rather than a curriculum focused on teaching in secondary schools. Similarly, students earning degrees in physical education may follow a curriculum focused on sports management or community

health, rather than one focused on teaching physical education in grades K-12. In both of these cases, the number of degrees conferred overstates the number of potential new teachers in those fields. The problem occurs in other education fields such as health education, business education, marketing education, agricultural education, and recreation education.

A second limitation of the accuracy of data on degrees conferred as a measure of potential new teacher supply is that, until 1980-81[1], many teacher candidates in secondary education or in K-12 subject areas could not be distinguished from non-teacher candidates because their degrees were conferred in disciplines other than education. For example, a chemistry major who had completed all requirements for the major, and all of the education courses needed to be certified, would be counted simply as a graduate in chemistry and not as a graduate of a teacher education program in chemistry. This problem occurred because the federal program taxonomy used to report data on degrees conferred did not distinguish regular chemistry majors from teacher education chemistry majors. A similar problem occurred in the following fields: biology, business, art, music, dramatic arts, most foreign languages, home economics, English, classics, speech, mathematics, physics, geology, psychology, economics, history, geography, political science, and sociology. Consequently, data on degrees conferred lead to an understatement

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[1]The problem continues to occur in the case of private schools because teacher education graduates with non-education majors are not separately identified on their annual report of degrees conferred.

of the potential supply of new teachers prepared to teach in these disciplines.

A final limitation of data on degrees conferred as a measure of potential new teacher supply is that they ignore "certification only" students. Increasingly important today, these students have already earned a degree (baccalaureate or master's) and return to college only to take the the course work needed to be certified. For example, a student may already have a master's degree in history but no course work in educational methods or student teaching. Such students enroll as non-degree seeking students, complete their course work, and then seek certification. They have no declared major and they do not receive a degree when they complete their programs. Consequently, they are not counted in degrees conferred data. Again, this problem leads to an understatement of potential new teacher supply from data on degrees conferred.

To summarize, the first limitation of degrees conferred data causes an overstatement of potential new teacher supply while the second and third limitations cause an understatement. The net effect is unknown.

Trends in Degrees Conferred in Education

With these limitations acknowledged, it is nevertheless instructive to examine some data on degrees conferred in the discipline of education. This is because time series data can still accurately reflect trends if sources of bias are relatively stable over the period described. There is no reason to believe otherwise in the present case.

Table III-A shows the trends in degrees conferred in several broad categories of education majors. Each category includes baccalaureate and master's degrees and intermediate certificates. Under each category, the first line presents the number of degrees conferred in each year; the second line presents the percentage that each number represents of its 1972-73 value. This percentage is an index of growth or decline relative to the 1972-73 value. For example, the value of 50 for elementary education in 1984-85 means that the number of elementary education degrees conferred by all North Carolina colleges and universities in 1984-85 was equal to 50 percent of the number conferred in 1972-73. A visual representation of the trends in education degree counts is presented in Figure III-A.

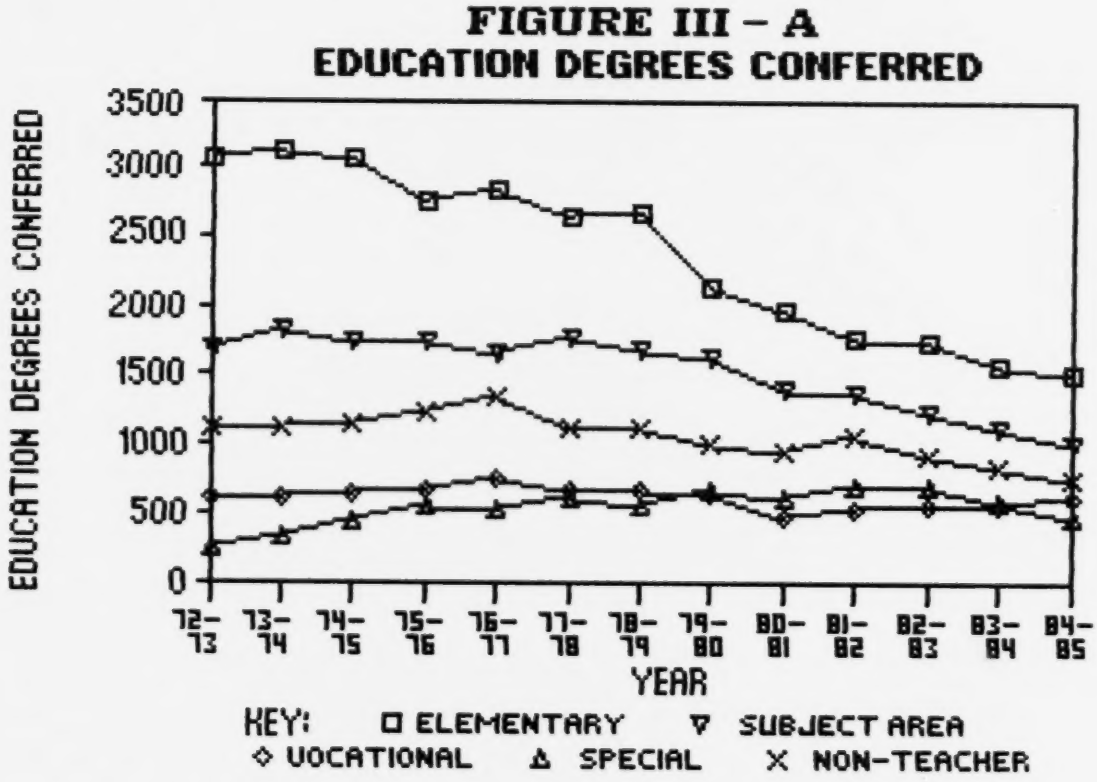
Two observations about these data seem particularly pertinent to this report. First, it is clear that the total number of degrees conferred by education departments and schools over the past 13 years has declined significantly. Overall, the number declined to 65 percent of the 1972-73 value, and to 62 percent of the peak value, which occurred in 1976-77. The decrease was even greater in the case of elementary education. Furthermore, degrees conferred in non-teaching professional education programs, such as guidance and counseling, curriculum and instruction, and educational administration, also declined by roughly the same magnitude as degrees conferred in teaching programs.

The second observation relates to the two "growth" categories - vocational education and special education. In the

TABLE III-A. BACCALAUREATE/MASTER'S DEGREES AND INTERMEDIATE CERTIFICATES CONFERRED IN EDUCATION BY NORTH CAROLINA SENIOR INSTITUTIONS, 1972-73 THROUGH 1984-85

	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
ELEMENTARY EDUCATION													
NUMBER	3,086	3,124	3,074	2,774	2,852	2,649	2,673	2,134	1,969	1,779	1,741	1,568	1,534
% OF 1972-73	100	101	100	90	92	86	87	69	64	58	56	51	50
GRADE LEVEL SUBJECT AREAS													
NUMBER	1,698	1,837	1,758	1,748	1,675	1,778	1,698	1,631	1,422	1,374	1,228	1,119	1,024
% OF 1972-73	100	108	104	103	99	105	100	96	84	81	72	66	60
VOCATIONAL EDUCATION													
NUMBER	625	607	663	667	748	688	675	638	485	535	562	553	631
% OF 1972-73	100	97	106	107	120	110	108	102	78	86	90	88	101
SPECIAL EDUCATION													
NUMBER	242	336	453	556	527	613	554	667	628	713	694	586	488
% OF 1972-73	100	139	187	230	218	253	229	276	260	295	287	242	202
ALL TEACHER EDUCATION													
NUMBER	5,651	5,904	5,948	5,745	5,802	5,728	5,600	5,070	4,504	4,401	4,225	3,826	3,677
% OF 1972-73	100	104	105	102	103	101	99	90	80	78	75	68	65
NON-TEACHER EDUCATION*													
NUMBER	1,136	1,126	1,163	1,250	1,354	1,119	1,132	1,016	960	1,062	927	844	762
% OF 1972-73	100	99	102	110	119	99	100	89	85	93	82	74	67
ALL EDUCATION													
NUMBER	6,787	7,030	7,111	6,995	7,156	6,847	6,732	6,086	5,464	5,463	5,152	4,670	4,439
% OF 1972-73	100	104	105	103	105	101	99	90	81	80	76	69	65

* Non-teacher education fields include educational administration and supervision, curriculum and instruction, guidance and counseling, and instructional and other fields that do not involve classroom teaching.
SOURCE: UNC-General Administration, September 1986.



SOURCE: UNC-General Administration, September, 1986.

case of vocational education, the increase was slight and probably overstated due to the first data limitation discussed above. In the case of special education, state and federal legislation and court rulings in the late 1960's and early 1970's caused public schools to increase their demand for teachers of exceptional children, and the data in Table III-A show that degrees conferred in this field increased by 195 percent between 1972-73 and 1981-82. However, over the past four years, employment levels and degree production in these areas have decreased. Neither vocational education nor special education is projected to be a growth area in the coming years.

The data in Table III-A reveal a strong responsiveness to changes in labor market conditions. For example, in response to the widely publicized surplus of teachers in elementary grades over the past decade, teacher production was cut in half. And, in response to the shortages of special education teachers, production was increased by 200 percent in only a decade. Such changes offer hope that college students will respond to shortages and surpluses in the future as they have in the past.

More Recent Data on New Teacher Supply

In 1980-81, the constituent institutions of The University of North Carolina modified their data collection system to allow for the identification of teacher certification candidates when this information was not obvious from their student status or the name of their degree program. The net effect of this modification was to increase by 11 percent the total number of teacher education degrees conferred reported by all North Carolina colleges and

universities over the period 1980-81 to 1984-85. However, the modification was not made to private school reporting systems, and furthermore, no provision for counting "certification only" students was made. Therefore, an undercount of potential new teachers continued to exist.

The remaining sources of under count were addressed by the new Candidate for Professional Certification (CPC) data collection system. Begun 1984-85, the new system sought to identify all currently enrolled students who had been formally admitted to a professional education program which could lead to certification by the State. The CPC system included both "certification only" students and students in teacher certification programs offered by non-education departments in private institutions. It was the first system specifically designed to produce a comprehensive count of all currently enrolled teacher education students. All students were counted who were enrolled any time during the 1984-85 academic year. An end-of-year follow-up count produced a subcount of students who had completed their programs of study on or before June 30, 1985. Table III-B presents data from the 1984-85 CPC system.

The data show that there were 11,930 candidates for professional certification enrolled in the 44 colleges and universities in North Carolina with professional education programs. Of these, 9912, or 83 percent, were enrolled in teacher education programs and 2018 were enrolled in non-teacher education programs. A major difference between public and private colleges is also revealed in this table. Of the 2018

TABLE III-B. CANDIDATES FOR PROFESSIONAL CERTIFICATION IN 1984-85
BY INSTITUTION AND EXPECTED YEAR OF COMPLETION

INSTITUTION	ALL ENROLLED CANDIDATES			ENROLLED TEACHER EDUCATION CANDIDATES		
	COMPLETED PROGRAM IN 1984-85	WILL COMPLETE AFTER 1984-85	TOTAL	COMPLETED PROGRAM IN 1984-85	WILL COMPLETE AFTER 1984-85	TOTAL
UNC INSTITUTIONS						
APPALACHIAN	590	893	1,483	514	834	1,348
EAST CAROLINA	902	935	1,837	699	616	1,315
ELIZABETH CITY	78	38	116	78	38	116
FAYETTEVILLE	164	258	422	147	258	405
NC A & T	291	399	690	241	354	595
NC CENTRAL	122	162	284	87	134	221
NC STATE	268	473	741	238	381	619
PEMBROKE	171	309	480	143	252	395
UNC-ASHEVILLE	23	87	110	23	87	110
UNC-CHAPEL HILL	394	387	781	340	299	639
UNC- CHARLOTTE	319	477	796	215	336	551
UNC-GREENSBORO	448	864	1,312	321	653	974
UNC-WILMINGTON	133	398	531	124	364	488
WESTERN CAROLINA	364	458	822	280	362	642
WINSTON-SALEM	53	28	81	53	28	81
UNC TOTAL	4,320	6,166	10,486	3,503	4,996	8,499
PRIVATE INSTITUTIONS						
ATLANTIC CHRISTIAN	35	33	68	35	33	68
BARBER-SCOTIA	6	0	6	6	0	6
BENNETT	11	41	52	11	41	52
CAMPBELL	55	179	234	49	155	204
CATAWBA	23	27	50	23	27	50
DAVIDSON	7	1	8	7	1	8
DUKE	4	1	5	4	1	5
ELON	21	28	49	21	28	49
GARDNER-WEBB	65	102	167	65	102	167
GREENSBORO	24	2	26	24	2	26
GUILFORD	10	25	35	10	24	34
HIGH POINT	17	27	44	17	27	44
JOHNSON C. SMITH	11	9	20	11	9	20
LENOIR-RHYNE	45	11	56	45	11	56
LIVINGSTONE	1	29	30	1	29	30
MARS HILL	74	12	86	74	12	86
MEREDITH	52	29	81	52	29	81
METHODIST	23	10	33	23	10	33
NC WESLEYAN	10	9	19	10	9	19
PFEIFFER	13	7	20	13	7	20
QUEENS	15	35	50	15	35	50
SACRED HEART	14	6	20	14	6	20
SALEM	13	18	31	13	18	31
SHAW	11	7	18	11	7	18
ST. ANDREWS	23	23	46	23	23	46
ST. AUGUSTINE°S	26	1	27	26	1	27
WAKE FOREST	37	42	79	37	42	79
WARREN WILSON	3	23	26	3	23	26
WINGATE	35	23	58	35	23	58
PRIVATE TOTAL	684	760	1,444	678	735	1,413
NC TOTAL	5,004	6,926	11,930	4,181	5,731	9,912

students enrolled in non-teacher education programs, 1987, or 98 percent, were in UNC institutions. Of those in teacher education programs, 8499, or 86 percent, were enrolled in UNC institutions. Thus, UNC institutions train more than 8 out of every 10 teacher education students and virtually all of the State's non-teacher education students.

The data also show that 5004 students completed their professional education programs on or before June 30, 1985. Of these, 4181, or 84 percent, were in teacher education programs. Of these 4181 completers, 3503, or 84 percent, were enrolled in UNC institutions.

The CPC data system asked all students to report their first and second choice certification areas as an indication of the subject area and grade level in which they would prefer to teach. For example, a student who earned a degree in elementary education may have taken course work which would qualify the student for teaching certificates in grades 4-6, and in middle grades mathematics and science. A student who earned a degree in physical education may have taken electives or minor courses to qualify for teaching certificates in middle grades English and social studies. In both of these examples, the CPC system would ask the student to report a first and second choice certification area.

The CPC system revealed an under count of teacher education graduates based on 1984-85 degrees conferred data. Moreover, for many students, it revealed significant differences between the subject area of their degree and their first choice certification

area.

Degrees Conferred Versus CPC

Column 1 of Table III-C shows the distribution of degrees conferred in 1984-85 by field. Column 2 shows the distribution of CPC teacher education completers by teaching field, based on the reported first choice certification area. Totals for the two columns reveal a 16 percent under count in the degrees conferred data due to the loss of 575 persons who were either "certification only" completers or graduates from private school teacher education programs offered by non-education departments. Column 3 presents a distribution of degrees conferred which has been augmented to correct for the under count. The correction for under count was based on the logic that the number of elementary education graduates was not subject to under count because "certification only" students are not typically seeking certification in elementary education, and because all elementary education degrees were offered by education departments and were therefore reported in the degrees conferred data. Based on this logic, the 575 students were distributed proportionately among the non-education areas. A similar approach was used to adjust degree data for the years 1980-81 through 1983-84. The discussion which follows makes comparisons between Column 2 entries - CPC completers - and Column 3 entries - degrees conferred.

TABLE III-C. 1984-85 DEGREES CONFERRED IN TEACHING FIELDS COMPARED TO FIRST CHOICE TEACHING FIELDS OF 1984-85 CPC COMPLETERS

TEACHING FIELD	DEGREES CONFERRED (1)	CPC COMPLETERS (2)	DEGREES CONFERRED (AUGMENTED) (3)
ELEMENTARY			
K THRU 3	NA	1195	NA
4 THRU 6	NA	258	NA
ELEMENTARY TOTAL	1524	1453	1524
K-12 SUBJECT AREAS			
SPEECH	1	4	1
READING	54	68	69
MUSIC	180	222	230
ART	64	68	82
THEATER ARTS/DANCE/OTHER	13	14	17
HEALTH/PHYSICAL ED.	464	380	592
DRIVER EDUCATION	14	21	18
K-12 SUBJECT AREAS TOTAL	790	778	1008
MIDDLE GRADES/SECONDARY (7-12)			
ENGLISH	99	224	126
MATH/COMPUTER ED.	117	232	149
SCIENCE			
BIOLOGY	29	70	37
CHEMISTRY	6	15	8
PHYSICS	1	4	1
GENERAL SCIENCE	88	160	112
SCIENCE TOTAL	124	250	158
SOCIAL STUDIES			
POLITICAL SCIENCE	1	0	1
GEOGRAPHY	1	1	1
HISTORY	31	46	40
ECONOMICS	0	2	0
SOCIOLOGY	4	0	5
GENERAL SOCIAL STUDIES	27	118	34
SOCIAL STUDIES TOTAL	64	168	82
FOREIGN LANGUAGE			
FRENCH	10	15	13
SPANISH	20	28	26
GERMAN	3	6	4
LATIN	1	6	1
OTHER FOREIGN LANGUAGE	0	0	0
FOREIGN LANGUAGE TOTAL	34	54	43
OTHER MIDDLE GRADES/SECONDARY	10	0	13
MIDDLE GRADES/SECONDARY TOTAL	448	927	572
VOCATIONAL EDUCATION			
AGRICULTURE	42	50	54
BUSINESS EDUCATION	4	61	5
HOME ECONOMICS	60	53	77
MARKETING/DIST. ED.	74	44	94
TRADE & INDUSTRY	0	24	0
HEALTH OCCUPATIONS	0	0	0
PRE-VOCATIONAL	0	14	0
INDUSTRIAL ARTS	131	124	167
VOCATIONAL HANDICAPPED	0	4	0
OTHER VOCATIONAL	0	0	0
ROTC	0	0	0
VOCATIONAL EDUCATION TOTAL	311	374	397
EXCEPTIONAL CHILDREN			
MENTALLY HANDICAPPED	11	204	14
SPEECH IMPAIRED	66	112	84
ACADEMICALLY GIFTED	2	14	3
EMOTIONALLY HANDICAPPED	14	19	18
HOMEBOUND/HOSPITALIZED	0	0	0
LEARNING DISABLED	9	68	11
PHYSICALLY HANDICAPPED	0	0	0
HEARING IMPAIRED	33	32	42
VISUALLY IMPAIRED	0	1	0
OTHER EXCEPTIONALITIES	398	198	508
EXCEPTIONAL CHILDREN TOTAL	533	648	680
TOTAL	3606	4181	4181

SOURCE: UNC-General Administration.

Discussion: Degrees Conferred Versus CPC Data

The data on CPC completers and degrees conferred give some insight into the difference between a student's major field in college and the expected field of certification. In elementary education and in K-12 subject areas, the data show fewer students indicating these areas as their first choice certification fields than those earning degrees in these fields. Apparently, students in these fields expect to be certified in one of the middle grades or secondary education fields. For example, CPC data show only 380 students who expect to receive certification in health and physical education while degrees conferred data show 592 students earning degrees in health and physical education. This pattern is repeated in almost every middle grades/secondary area.

The number of CPC completers is approximately equal to the number of degrees conferred in the categories of vocational education and exceptional children. However, significant differences exist within these categories. In the vocational education fields of business education, trade and industry, and pre-vocational education, there are more CPC completers than degrees conferred. In home economics, marketing, and industrial arts, there are fewer. In the exceptional education fields, there are more CPC completers than degrees conferred in all fields except hearing impaired and other exceptionalities. In the case of other exceptionalities, the large difference is due to the fact that students earn degrees in the general field of special education, but earn minors and concentrations which qualify them for certification in specific areas such as mentally

handicapped or emotionally handicapped.

The counts of CPC completers and degrees conferred in specific fields reveal some large and unsettling differences. In the case of broad categories such as elementary education or vocational education, the differences are less striking than they are in the case of specific fields (if one treats K-12 and middle/secondary grades as one category). However, in specific fields, such as health and physical education, English, mathematics, biology, chemistry, general social studies, home economics, business education, marketing/distributive education, mentally handicapped, learning disabled and other exceptionalities, the differences tend to be large.

In this report the supply of potential new teachers is based on an assumption that the distribution and production of teacher education graduates remain fixed at 1984-85 levels.[2] Columns 2 and 3 of Table III-C offer two alternative distributions for calculating the production of new teachers during the projection period. The arguments in favor of using each alternative are summarized below.

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[2] Preliminary data for 1985-86 suggest that there are few changes in 1985-86 compared to 1984-85.

Four arguments favor using CPC data:

1. CPC data are more inclusive because they specifically cover "certification only" completers, and graduates in arts and sciences teacher education programs in private institutions.
2. The teaching field of each completer is based on the student's response to the question, "In which area(s) are you planning to seek certification?" The responding student is given an opportunity to indicate a first and second choice certification area and the distribution is based on the first choice area.
3. The number of completers in each field was not augmented to adjust for an under count as was done in the case of the degrees conferred data.
4. CPC data show best the relationship between a student's major in college and the expected field of certification.

Five arguments favor using degrees conferred data:

1. The degree reflects a graduate's primary field of training, and this is likely to be the person's first choice teaching field in the long run.
2. Future changes in the certification process are likely to make it more difficult to teach in an area other than one's major.
3. Because a graduate can often qualify for several certification areas, the first choice area may not be a very reliable predictor of the field in which the person will actually teach.

4. The CPC distribution includes some imputed certification areas. Areas were imputed for graduates of UNC institutions who were known to have completed a teacher education degree in 1984-85, but did not complete a CPC form in that year. Although the imputations were based on the observed relationships between major field and certification areas, these relationships were often weak and the resulting imputations were imprecise.

5. Data on degrees conferred are the only data available for the years before 1984-85, and are thus more comparable and continuous than CPC data.

To summarize, the data in Table III-C present two alternative distributions of graduates by likely teaching field. There are cogent arguments in favor of using each distribution as a basis for projecting teacher supply. Therefore, this report will use both and will make comparisons between the two. The best measure of shortage or surplus is probably one which falls between those estimated by the two different projections of newly trained teachers.

Augmented Data on Degrees Conferred: 1980-81 Through 1984-85

Table III-D presents data on degrees conferred by teaching field for the years 1980-81 through 1984-85. All data have been augmented to adjust for the under count which was observed in the 1984-85 data.

An examination of the five-year series reveals several interesting trends. Total degree production in teacher education programs has declined by 22 percent since 1980-81. Degrees

TABLE III-D. DEGREES CONFERRED BY NORTH CAROLINA TEACHER EDUCATION PROGRAMS (AUGMENTED)
1980-81 THROUGH 1984-85

TEACHING FIELD	1980-81	1981-82	1982-83	1983-84	1984-85
ELEMENTARY					
K THRU 3	NA	NA	NA	NA	NA
4 THRU 6	NA	NA	NA	NA	NA
ELEMENTARY TOTAL	1968	1779	1741	1568	1524
K-12 SUBJECT AREAS					
SPEECH	1	9	9	4	1
READING	190	148	145	94	69
MUSIC	306	284	265	255	230
ART	128	117	113	96	82
THEATER ARTS/DANCE/OTHER	10	28	22	15	17
HEALTH/PHYSICAL ED.	863	837	728	665	592
DRIVER EDUCATION	41	39	42	24	18
K-12 SUBJECT AREAS TOTAL	1540	1462	1323	1153	1008
MIDDLE GRADES/SECONDARY (7-12)					
ENGLISH	120	117	133	141	126
MATH/COMPUTER ED.	107	127	114	127	149
SCIENCE					
BIOLOGY	42	58	44	35	37
CHEMISTRY	6	14	16	9	8
PHYSICS	0	1	0	0	1
GENERAL SCIENCE	103	96	89	119	112
SCIENCE TOTAL	152	169	150	163	158
SOCIAL STUDIES					
POLITICAL SCIENCE	3	6	1	1	1
GEOGRAPHY	6	5	1	3	1
HISTORY	45	59	66	49	40
ECONOMICS	0	3	0	1	0
SOCIOLOGY	11	11	18	3	5
GENERAL SOCIAL STUDIES	63	57	48	54	34
SOCIAL STUDIES TOTAL	128	141	135	112	82
FOREIGN LANGUAGE					
FRENCH	17	11	14	10	13
SPANISH	17	15	24	15	26
GERMAN	1	1	1	3	4
LATIN	1	1	0	3	1
OTHER FOREIGN LANGUAGE	0	0	0	0	0
FOREIGN LANGUAGE TOTAL	36	29	39	30	43
OTHER MIDDLE GRADES/SECONDARY	31	88	28	9	13
MIDDLE GRADES/SECONDARY TOTAL	573	672	599	582	572
VOCATIONAL EDUCATION					
AGRICULTURE	63	34	39	47	54
BUSINESS EDUCATION	10	13	3	1	5
HOME ECONOMICS	70	92	81	77	77
MARKETING/DIST. ED.	147	119	103	90	94
TRADE & INDUSTRY	0	0	0	0	0
HEALTH OCCUPATIONS	0	0	0	0	0
PRE-VOCATIONAL	0	0	0	0	0
INDUSTRIAL ARTS	126	134	114	148	167
VOCATIONAL HANDICAPPED	0	0	0	0	0
OTHER VOCATIONAL	0	0	0	0	0
ROTC	0	0	0	0	0
VOCATIONAL EDUCATION TOTAL	416	391	340	364	397
EXCEPTIONAL CHILDREN					
MENTALLY HANDICAPPED	3	11	43	27	14
SPEECH IMPAIRED	110	122	109	114	84
ACADEMICALLY GIFTED	0	0	0	0	3
EMOTIONALLY HANDICAPPED	0	0	6	19	18
HOMEBOUND/HOSPITALIZED	0	0	0	0	0
LEARNING DISABLED	0	1	19	8	11
PHYSICALLY HANDICAPPED	0	0	0	0	0
HEARING IMPAIRED	68	62	55	46	42
VISUALLY IMPAIRED	0	0	0	0	0
OTHER EXCEPTIONALITIES	704	797	723	624	508
EXCEPTIONAL CHILDREN TOTAL	884	994	956	836	680
TOTAL	5381	5298	4959	4503	4181

SOURCE: UNC-General Administration.

conferred in elementary education have declined by 23 percent.

None of the K-12 special subject areas has shown significant increases in the past five years. Total production in these areas has decreased by 34 percent. The largest decrease was in reading education, which declined by 64 percent. Other areas which showed decreases of 25 percent or more include music education, art education, health and physical education, and driver education.

Graduates in middle grades and secondary subject areas have remained constant over the five years. However, there have been changes within certain fields. The number of mathematics education graduates has increased by 39 percent since 1980-81. Social studies graduates have decreased by 36 percent, and the decrease is largely due to the decrease in general social studies graduates. Similarly, the slight increase in foreign language graduates can be attributed to an increase in Spanish degrees. Most fields with zero graduates are teaching fields which are recognized by the State's system for classifying teaching fields, but are not offered as separate majors by North Carolina colleges and universities.

Vocational education totals have remained stable since 1980-81, but decreases have occurred in business education as well as in marketing education, and an increase in industrial arts graduates. While degrees in argiculture were lower in 1984-85 than in 1980-81, there have been increases in each of the last three years.

Fields in the education of exceptional children which have

experienced a decrease are the education of the speech impaired and the hearing impaired. Those which have experienced an increase are the education of the mentally handicapped, emotionally handicapped and learning disabled. Total degrees in these fields have decreased by 23 percent over the past five years.

Finally, it is instructive to note those fields which have had little degree production in absolute terms. For example, there have been only two graduates in physics since 1980-81. Economics, German, Latin and the instruction of the academically gifted are all fields with 10 or fewer graduates.

Certified But Not Currently Employed Teachers

In order to teach in a North Carolina public school, a person must be certified by the State. In 1985-86, there were 77 teacher certification areas which permitted teachers to offer instruction in more than 210 subjects and grade levels. Most teachers hold more than one certification area and all must renew these certifications periodically to keep them current. The State maintains a file of all teachers who were certified as of the 1971-72 school year or have become certified since then. Unfortunately, no data on the current career status of persons not presently teaching in the public schools are kept on file. Therefore, it is not possible to know if such persons have been teaching outside the public schools, employed in a non-teaching job, moved to another state, retired, or even died. Thus, the certification file alone can provide only limited data on the stock of available teachers.

In order to deal with some of these limitations, records on the certification file were deleted for persons were over the age of 45 or were teaching in 1985-86. This reduced the number of records from 230,000 to 96,000. Implicit in this approach is an assumption that persons over 45 are not likely to reenter teaching, an assumption which is supported by age data on new hires.

The records were grouped into four mutually exclusive categories according to whether the person had worked as a public school teacher at all since 1971-72 and whether the certificate had lapsed. It seems reasonable to assume that persons who have not taught in a public school in 15 years and have allowed their certificates to expire are not likely to seek a job as a public school teacher in the future. Conversely, persons with recent public school teaching experience and current certificates are probably somewhat likely to reenter public school teaching in the future. Of course, the probability of reentry is unknown for all groups, and currently available data make it impossible to estimate reentry rates. However, recent efforts by the State Department of Public Instruction to update the certification file and to compare new hires in one year with the previous year's certification file, promise to change this situation in the future. For now, however, one can only speculate about the data shown in Table III-E.

The most important fact about these data is that all counts refer to persons who are certified to teach in that area. Because most teachers are certified in more than one area, the

TABLE III-E. CERTIFICATION FIELDS OF TEACHERS NOT TEACHING IN NORTH CAROLINA PUBLIC SCHOOLS IN 1985-86 BY CERTIFICATION STATUS AND EMPLOYMENT STATUS IN YEARS BETWEEN 1971-72 AND 1984-85

		LAPSED CERTIFICATES		VALID CERTIFICATES	
TEACHING FIELD	TOTAL CERTIFICATIONS	HAS BEEN EMPLOYED	NEVER BEEN EMPLOYED	HAS BEEN EMPLOYED	NEVER BEEN EMPLOYED
ELEMENTARY					
ELEMENTARY 1-8	181	38	98	37	8
PRIMARY 1-4	4816	1070	3050	501	195
GRAMMAR 4-8	3444	676	2182	419	167
EARLY CHILDHOOD K-4	17530	4476	5720	3551	3783
INTERMEDIATE 4-6	15551	4837	5141	3067	2506
ELEMENTARY TOTAL	41522	11097	16191	7575	6659
K-12 SUBJECT AREAS					
SPEECH	690	160	394	72	64
READING	2396	634	361	898	503
MUSIC	4666	1041	2269	600	756
ART	2968	749	1468	394	357
THEATER ARTS/DANCE/OTHER	319	61	130	47	81
HEALTH/PHYSICAL ED.	14599	2942	8598	1412	1647
DRIVER EDUCATION	291	124	71	74	22
K-12 SUBJECT AREAS TOTAL	25929	5711	13291	3497	3430
MIDDLE GRADES/SECONDARY (7-12)					
ENGLISH	18764	5307	8156	3051	2250
MATH/COMPUTER ED.	5834	1579	2395	1183	677
SCIENCE					
BIOLOGY	2143	572	1107	244	220
CHEMISTRY	426	94	246	44	42
PHYSICS	180	53	91	14	22
GENERAL SCIENCE	4197	1204	1502	915	576
SCIENCE TOTAL	6946	1923	2946	1217	860
SOCIAL STUDIES					
POLITICAL SCIENCE	275	72	158	23	22
GEOGRAPHY	202	53	121	21	7
HISTORY	2713	564	1616	268	265
ECONOMICS	250	67	148	18	17
SOCIOLOGY	465	126	239	63	37
GENERAL SOCIAL STUDIES	15314	4155	7092	2453	1614
SOCIAL STUDIES TOTAL	19219	5037	9374	2846	1962
FOREIGN LANGUAGE					
FRENCH	2023	497	1104	257	165
SPANISH	1429	369	730	211	119
GERMAN	246	68	124	23	31
LATIN	194	53	88	36	17
OTHER FOREIGN LANGUAGE	17	2	11	2	2
FOREIGN LANGUAGE TOTAL	3909	989	2057	529	334
OTHER MIDDLE GRADES/SECONDARY	266	45	117	37	67
MIDDLE GRADES/SECONDARY TOTAL	54938	14880	25045	8863	6150
VOCATIONAL EDUCATION					
AGRICULTURE	505	198	191	69	47
BUSINESS EDUCATION	4356	759	2775	411	411
HOME ECONOMICS	2808	620	1531	368	289
MARKETING/DIST. ED.	427	145	174	80	28
TRADE & INDUSTRY	1132	692	227	173	40
HEALTH OCCUPATIONS	110	82	13	13	2
PRE-VOCATIONAL	642	384	27	205	26
INDUSTRIAL ARTS	1199	358	574	152	115
VOCATIONAL HANDICAPPED	301	175	12	102	12
OTHER VOCATIONAL	0	0	0	0	0
ROTC	5	2	2	0	1
VOCATIONAL EDUCATION TOTAL	11485	3415	5526	1573	971
EXCEPTIONAL CHILDREN					
MENTALLY HANDICAPPED	4779	1501	1121	1228	929
SPEECH IMPAIRED	1697	532	565	362	238
ACADEMICALLY GIFTED	520	189	16	274	41
EMOTIONALLY HANDICAPPED	1280	300	267	395	318
HOMEBOUND/HOSPITALIZED	34	15	0	18	1
LEARNING DISABLED	2451	641	357	879	574
PHYSICALLY HANDICAPPED	166	48	29	40	49
HEARING IMPAIRED	852	153	199	218	282
VISUALLY IMPAIRED	117	30	19	32	36
OTHER EXCEPTIONALITIES	303	5	20	101	177
EXCEPTIONAL CHILDREN TOTAL	12199	3414	2593	3547	2645
TOTAL CERTIFICATION AREAS	146073	38517	62646	25055	19855
TOTAL PERSONS WITH CERTIFICATES	96623	23925	46649	13595	12454

SOURCE: State Department of Public Instruction.

entries in the table reflect double counting. The extent of double counting can be understood by comparing the count of persons shown on the last line of the table with the count of certifications that they hold which are shown on the next to last line.

The counts show that almost half of these potential teachers (46,649) have no recent public school teaching experience and have allowed their certificates to expire. Almost a fourth have some recent teaching experience but have allowed their certificates to expire. About an eighth have no recent public school teaching experience but hold a currently valid certificate; and another eighth have some recent public school teaching experience and also hold a valid teaching certificate. Many of those with currently valid certificates may be working in private elementary or secondary schools, or in North Carolina colleges and universities, or in other states.

Although there are obvious difficulties in interpreting these data, it seems reasonable to assume that persons who have allowed their certificates to expire have little, if any, interest in public school teaching since the cost of renewing a certificate is low. This assumption enables the reader to focus on those with currently valid certificates. Here, the data suggest that some teaching fields have few reserve teachers while others have many. Fields with the largest reserves are elementary education, health and physical education, English, general social studies, and instruction for the mentally handicapped. Fields with small reserves are speech, theater arts/dance/other, driver

education, chemistry, physics, political science, geography, economics, sociology, German, Latin, agriculture, marketing and distributive education, health occupations, and instruction of the homebound and hospitalized, physically disabled, and visually impaired. As will be seen in the next chapter, many fields with large reserves are fields in which surpluses are projected, and many fields with small reserves are fields in which shortages are projected.

IV. SUPPLY VERSUS DEMAND

This chapter presents data on projected shortages by teaching field and projected shortages overall. The data on shortages by field compare cumulative totals of new hires with cumulative totals of teacher education graduates for the past five years and for the coming five years. A calculation on out-of-field teaching is then used to corroborate findings. The purpose of this approach is not to make individual year projections for each field because this would overtax the data base, but rather to be able to identify shortage areas over a broader expanse of time, usually the period 1980-81 through 1990-91.

Data on teacher shortages overall are presented for the coming decade. An analysis of the key parameters underlying these projections illustrates the uncertainty associated with them. This analysis helps explain why growth in teacher work force is associated with magnified growth in teacher education production.

Shortages and Out-of-Field Teaching

Other nationwide studies have revealed shortages in certain teaching fields such as mathematics, the sciences, foreign languages and some special education fields. No doubt North Carolina public schools have also experienced problems in these areas. However, these problems have not caused any unfilled vacancies. Instead, they have probably caused principals to hire average or better teachers who lack proper training, or to hire

below average teachers who have had proper training, or perhaps to assign currently employed teachers to teach classes for which they were not trained and have not been certified. In two of these three hypothetical responses to shortages, one would expect to find teachers employed "out-of-field". Thus, in the aggregate, fields with shortages would be expected to have a greater incidence of out-of-field teachers among new hires and the entire work force than would fields with balances or surpluses. Thus, data on out-of-field teaching can help to identify fields which are already experiencing shortages.

Data on out-of-field teaching are not easy to construct. It is not always obvious from one's teaching certificate which courses may be taught. Much, perhaps most, out-of-field teaching occurs when a teacher is responsible for only one or two courses outside his or her field. Often a teacher may be certified to teach a subject at one grade level but not at another, and always the boundaries between grade levels overlap. In small schools, curriculum limitations may force teachers to be responsible for many subjects, some of which are outside their certification areas. These situations demonstrate that not all cases of out-of-field teaching are strictly associated with shortages, and those which are, are often difficult to measure.

The approach to measuring out-of-field teaching in this report is one which tries to address many of these problems, but should nevertheless be viewed as illustrative and not definitive. Simply stated, it classifies teachers who were employed by the North Carolina public schools in 1985-86 according to a primary

teaching field, and compares this field to those covered by their certificates. If a match is not found, they are classified as being out-of-field. This approach insures that whenever a teacher is so classified, he or she teaches at least two, and usually three or more, courses in a field in which he or she is not certified. (See appendix A for details.)

Table IV-A presents data on the incidence of out-of-field teaching among new hires and the entire teacher work force. Fields in which the percentage out-of-field exceeds the overall average, 13.78 percent, may be fields which have experienced shortages in the recent past. These fields include speech, reading, theater arts/dance/other, English, mathematics and computer education, physics, general science, political science, geography, economics, sociology, general social studies, German, Latin, and instruction of the vocationally handicapped, mentally handicapped, academically gifted, emotionally handicapped, homebound/hospitalized, learning disabled, physically handicapped, visually impaired, and hearing impaired. These fields are in general agreement with the findings of other supply/demand studies except in the fields of speech, English, sociology, and general social studies. Also, chemistry, a field generally labeled a shortage field in other studies, has a below average incidence of out-of-field teaching.

Speech, sociology, and many special education fields may have a higher than average incidence of out-of-field teaching because they often represent such a small part of the curriculum that schools find it inefficient to hire teachers with such

TABLE IV-A. INCIDENCE OF OUT-OF-FIELD TEACHING AMONG NORTH CAROLINA PUBLIC SCHOOL TEACHERS: 1985-86 NEW HIRES VERSUS 1985-86 TOTAL WORK FORCE *

TEACHING FIELD	NEW HIRES	PERCENT OUT OF FIELD	TOTAL WORK FORCE	PERCENT OUT OF FIELD
ELEMENTARY				
K THRU 3	884	2.60%	12790	2.09%
4 THRU 6	776	7.09%	9640	3.40%
ELEMENTARY TOTAL	1660	4.70%	22430	2.64%
K-12 SUBJECT AREAS				
SPEECH	2	100.00%	17	70.59%
READING	232	25.00%	2093	18.73%
MUSIC	184	5.43%	1452	7.44%
ART	80	2.50%	740	3.38%
THEATER ARTS/DANCE/OTHER	21	19.05%	113	50.44%
HEALTH/PHYSICAL ED.	219	1.83%	2393	1.63%
DRIVER EDUCATION	15	6.67%	473	3.81%
K-12 SUBJECT AREAS TOTAL	753	10.76%	7281	8.94%
MIDDLE GRADES/SECONDARY (7-12)				
ENGLISH	542	20.48%	5045	9.63%
MATH/COMPUTER ED.	493	20.28%	3997	13.49%
SCIENCE				
BIOLOGY	81	7.41%	816	4.78%
CHEMISTRY	22	4.55%	262	5.34%
PHYSICS	9	0.00%	85	10.59%
GENERAL SCIENCE	268	26.12%	1839	14.68%
SCIENCE TOTAL	380	20.26%	3002	11.06%
SOCIAL STUDIES				
POLITICAL SCIENCE	90	14.44%	669	13.75%
GEOGRAPHY	3	0.00%	38	15.79%
HISTORY	79	8.86%	990	5.25%
ECONOMICS	7	14.29%	41	14.63%
SOCIOLOGY	3	33.33%	38	15.79%
GENERAL SOCIAL STUDIES	121	21.49%	1090	13.39%
SOCIAL STUDIES TOTAL	303	15.84%	2866	10.75%
FOREIGN LANGUAGE				
FRENCH	28	14.29%	326	5.52%
SPANISH	69	8.70%	417	6.47%
GERMAN	6	16.67%	36	16.67%
LATIN	14	21.43%	65	18.46%
OTHER FOREIGN LANGUAGE	15	66.67%	51	45.10%
FOREIGN LANGUAGE TOTAL	132	18.18%	895	9.61%
OTHER MIDDLE GRADES/SECONDARY	204	28.43%	742	22.64%
MIDDLE GRADES/SECONDARY TOTAL	2054	20.35%	16547	11.60%
VOCATIONAL EDUCATION				
AGRICULTURE	23	0.00%	338	0.89%
BUSINESS EDUCATION	83	3.61%	1284	3.58%
HOME ECONOMICS	52	1.92%	847	0.47%
MARKETING/DIST. ED.	7	0.00%	93	5.38%
TRADE & INDUSTRY	75	10.67%	1089	4.96%
HEALTH OCCUPATIONS	16	6.25%	154	0.65%
PRE-VOCATIONAL	62	19.35%	657	7.15%
INDUSTRIAL ARTS	38	5.26%	312	7.69%
VOCATIONAL HANDICAPPED	11	27.27%	192	15.10%
OTHER VOCATIONAL	8	62.50%	32	46.88%
ROTC	35	5.71%	107	4.67%
VOCATIONAL EDUCATION TOTAL	410	9.02%	5105	4.56%
EXCEPTIONAL CHILDREN				
MENTALLY HANDICAPPED	151	23.18%	1652	13.50%
SPEECH IMPAIRED	85	2.35%	618	2.75%
ACADEMICALLY GIFTED	77	31.17%	888	20.50%
EMOTIONALLY HANDICAPPED	86	39.53%	422	35.55%
HOMEBOUND/HOSPITALIZED	3	100.00%	91	54.95%
LEARNING DISABLED	163	28.22%	1559	33.87%
PHYSICALLY HANDICAPPED	11	54.55%	60	68.33%
HEARING IMPAIRED	23	8.70%	104	14.42%
VISUALLY IMPAIRED	4	0.00%	24	29.17%
OTHER EXCEPTIONALITIES	138	5.80%	963	2.18%
EXCEPTIONAL CHILDREN TOTAL	741	21.59%	6381	19.34%
TOTAL	5618	13.78%	57744	8.02%

* A teacher is classified as being out-of-field if he or she is not certified to teach in his or her primary teaching field as calculated from the fall 1985 PPAR (Professional Personnel Activity Report) data.

SOURCE: State Department of Public Instruction, See Appendix A for definitions.

specialized training. General social studies probably has a higher than average incidence of out-of-field teaching because many social studies teachers offer classes in grades 7-12, but are only certified at the middle grades or secondary level but not at both levels. Another possible explanation is that coaches with certification in physical education are often assigned to teach general social studies courses. The finding that most chemistry teachers are "in-field" is somewhat unexpected although it may be explained by the fact that chemistry teachers can be certified to teach chemistry if they hold a degree in science education and not in chemistry per se.

Projections by Field

It is important to have evidence of past shortages in order to interpret data on projected shortages. Projected shortages which build on past shortages will become acute, while projected shortages which build on past surpluses may be mild at worst. The severity of the shortage depends upon the rate of entry into teaching of those who are certified but not now teaching in a North Carolina public school. In fields with a surplus, this stock will tend to build over time. In fields with a shortage, it will tend to become depleted over time. Data on out-of-field teaching and on the stock of reserve teachers indicate which fields have below average reserves for resolving projected shortages.

The standard approach to making teacher supply/demand projections is to compare projections of additional teachers needed each year (demand) with new teacher education graduates

(supply) by teaching field. When demand exceeds supply, the field is projected to experience a shortage. This approach assumes a constant or decreasing number of entrants into teaching from the stock of reserve teachers. This assumption seems reasonable if projected shortages are recurring, acute, or both. A plausible way of determining if projected shortages are recurring is to see if they will last over a period longer than year or two, say five years. A way of determining if they are acute is to see if they are built on past shortages or on past surpluses.

Tables IV-B and IV-C present projections by field which follow this approach. The only difference between the two tables is that projections in IV-B are based on CPC distributions of graduates and completers while projections in IV-C are based on augmented degrees conferred distributions. (The reader may wish to review the explanations of Columns 2 and 3 in Table III-C.) In both tables, the projected number of teacher education graduates in each field over the five-year projection period are calculated by multiplying the numbers in Columns 2 and 3 of Table III-C, respectively, by five[1]. This is equivalent to assuming that annual output in each field during the projection period will remain at the level observed in 1984-85. Is this reasonable?

The answer depends on the interpretation of projected supply. As discussed in the introduction of this report, the projections of supply and demand are not intended to provide

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[1] Subject to rounding errors.

TABLE IV-B. FIVE-YEAR CUMULATIVE TOTALS OF NORTH CAROLINA TEACHER EDUCATION GRADUATES* AND NEWLY HIRED PUBLIC SCHOOL TEACHERS BY TEACHING FIELD
(BASED ON DEGREES CONFERRED AND CPC DATA)

	PAST FIVE YEARS				PROJECTED NEXT FIVE YEARS				PAST + PROJECTED			
TEACHING FIELD	(1) TOTAL GRADUATES (80-81 to 84-85)	(2) NEW HIRES (81-82 to 85-86)	(3) DIFFERENCE (1)-(2)	(4) RATIO (1)-(2)	(5) TOTAL GRADUATES (85-86 to 89-90)	(6) NEW HIRES (86-87 to 90-91)	(7) DIFFERENCE (5)-(6)	(8) RATIO (5)-(6)	(9) TOTAL GRADUATES (80-81 to 89-90)	(10) NEW HIRES (81-82 to 90-91)	(11) DIFFERENCE (9)-(10)	(12) RATIO (9)-(10)
ELEMENTARY												
K THRU 3	NA	3654	NA	NA	5973	6704	-731	NA	NA	10358	NA	NA
4 THRU 6	NA	3191	NA	NA	1292	5637	-4345	NA	NA	8828	NA	NA
ELEMENTARY TOTAL	8580	6845	1735	1.25	7264	12341	-5077	0.59	15844	19186	-3342	0.83
K-12 SUBJECT AREAS												
SPEECH	24	7	17	3.43	22	5	17	4.40	46	12	34	3.83
READING	645	949	-304	0.68	342	439	-97	0.78	987	1388	-401	0.71
MUSIC	1340	819	521	1.64	1110	920	190	1.21	2450	1739	711	1.41
ART	536	426	110	1.26	342	508	-166	0.67	878	934	-56	0.94
THEATER ARTS/DANCE/OTHER	91	77	14	1.18	72	93	-21	0.77	163	170	-7	0.96
HEALTH/PHYSICAL ED.	3686	1112	2574	3.31	1899	1426	473	1.33	5585	2538	3047	2.20
DRIVER EDUCATION	164	96	68	1.71	105	210	-105	0.50	269	306	-37	0.88
K-12 SUBJECT AREAS TOTAL	6487	3486	3001	1.86	3892	3601	291	1.08	10379	7087	3292	1.46
MIDDLE GRADES/SECONDARY (7-12)												
ENGLISH	638	1833	-1195	0.35	1121	2208	-1087	0.51	1759	4041	-2282	0.44
MATH/COMPUTER ED.	625	1782	-1157	0.35	1159	1904	-745	0.61	1784	3686	-1902	0.48
SCIENCE												
BIOLOGY	217	325	-108	0.67	348	268	80	1.30	565	593	-28	0.95
CHEMISTRY	53	100	-47	0.53	77	183	-106	0.42	130	283	-153	0.46
PHYSICS	3	32	-29	0.09	22	70	-48	0.31	25	102	-77	0.25
GENERAL SCIENCE	520	913	-393	0.57	800	1056	-256	0.76	1320	1969	-649	0.67
SCIENCE TOTAL	792	1370	-578	0.58	1748	1577	-329	0.79	2040	2947	-907	0.69
SOCIAL STUDIES												
POLITICAL SCIENCE	13	190	-177	0.07	0	238	-238	0.00	13	428	-415	0.03
GEOGRAPHY	17	17	0	1.00	6	15	-9	0.40	23	32	-9	0.72
HISTORY	259	298	-39	0.87	232	278	-46	0.83	491	576	-85	0.85
ECONOMICS	4	19	-15	0.21	11	54	-43	0.20	15	73	-58	0.21
SOCIOLOGY	48	13	35	3.69	0	7	-7	0.00	48	20	28	2.40
GENERAL SOCIAL STUDIES	256	529	-273	0.48	591	670	-79	0.88	847	1199	-352	0.71
SOCIAL STUDIES TOTAL	597	1066	-469	0.56	839	1262	-423	0.66	1436	2328	-892	0.62
FOREIGN LANGUAGE												
FRENCH	65	134	-69	0.49	77	205	-128	0.38	142	339	-197	0.42
SPANISH	97	195	-98	0.50	138	251	-113	0.55	235	446	-211	0.53
GERMAN	10	14	-4	0.71	28	14	14	2.00	38	28	10	1.36
LATIN	6	41	-35	0.15	28	72	-44	0.39	34	113	-79	0.30
OTHER FOREIGN LANGUAGE	0	50	-50	0.00	0	58	-58	0.00	0	108	-108	0.00
FOREIGN LANGUAGE TOTAL	178	434	-256	0.41	270	600	-330	0.45	448	1034	-586	0.43
OTHER MIDDLE GRADES/SECONDARY	168	454	-286	0.37	0	646	-646	0.00	168	1100	-932	0.15
MIDDLE GRADES/SECONDARY TOTAL	2998	6939	-3941	0.43	4637	8197	-3560	0.57	7635	15136	-7501	0.50
VOCATIONAL EDUCATION												
AGRICULTURE	236	135	101	1.75	248	58	190	4.28	484	193	291	2.51
BUSINESS EDUCATION	32	370	-338	0.09	304	422	-118	0.72	336	792	-456	0.42
HOME ECONOMICS	397	259	138	1.53	265	167	98	1.59	662	426	236	1.55
MARKETING (DIST.) ED.	553	79	474	7.00	221	60	161	3.68	774	139	635	5.57
TRADE & INDUSTRY	0	456	-456	0.00	121	271	-150	0.45	121	727	-606	0.17
HEALTH OCCUPATIONS	0	78	-78	0.00	0	65	-65	0.00	0	143	-143	0.00
PRE-VOCATIONAL	0	333	-333	0.00	72	226	-154	0.32	72	559	-487	0.13
INDUSTRIAL ARTS	690	164	526	4.21	618	172	446	3.59	1308	336	972	3.89
VOCATIONAL HANDICAPPED	0	104	-104	0.00	22	156	-134	0.14	22	260	-238	0.08
OTHER VOCATIONAL	0	24	-24	0.00	0	1	-1	0.00	0	25	-25	0.00
ROTC	0	155	-155	0.00	0	175	-175	0.00	0	330	-330	0.00
VOCATIONAL EDUCATION TOTAL	1908	2157	-249	0.88	1871	1773	98	1.06	3779	3930	-151	0.96
EXCEPTIONAL CHILDREN												
MENTALLY HANDICAPPED	98	1061	-963	0.09	1021	184	837	5.55	1119	1245	-126	0.90
SPEECH IMPAIRED	540	489	51	1.10	558	528	30	1.06	1098	1017	81	1.08
ACADEMICALLY GIFTED	3	355	-352	0.01	72	712	-640	0.10	75	1067	-992	0.07
EMOTIONALLY HANDICAPPED	43	421	-378	0.10	94	293	-199	0.32	137	714	-577	0.19
HOMEBOUND/HOSPITALIZED	0	58	-58	0.00	0	8	-8	0.00	0	66	-66	0.00
LEARNING DISABLED	39	935	-896	0.04	342	1042	-700	0.33	381	1977	-1596	0.19
PHYSICALLY HANDICAPPED	0	46	-46	0.00	0	30	-30	0.00	0	76	-76	0.00
HEARING IMPAIRED	272	103	169	2.64	160	71	89	2.25	432	174	258	2.48
VISUALLY IMPAIRED	0	21	-21	0.00	6	42	-36	0.14	6	63	-57	0.10
OTHER EXCEPTIONALITIES	3355	277	3078	12.11	988	1307	-319	0.76	4343	1584	2759	2.74
EXCEPTIONAL CHILDREN TOTAL	4350	3766	584	1.16	3240	4217	-977	0.77	7590	7983	-393	0.95
TOTAL	24322	23193	1129	1.05	20905	30129	-9224	0.69	45227	53322	-8095	0.85

* Based on augmented degrees conferred data for past five years and CPC completer data for projected five years.
SOURCE: UNC-General Administration.

TABLE IV-C. FIVE-YEAR CUMULATIVE TOTALS OF NORTH CAROLINA TEACHER EDUCATION GRADUATES* AND NEWLY HIRED PUBLIC SCHOOL TEACHERS BY TEACHING FIELD
(BASED ON DEGREES CONFERRED)

	PAST FIVE YEARS				PROJECTED NEXT FIVE YEARS				PAST + PROJECTED			
TEACHING FIELD	(1) TOTAL GRADUATES (80-81 to 84-85)	(2) NEW HIRES (81-82 to 85-86)	(3) DIFFERENCE (1)-(2)	(4) RATIO (1)-(2)	(5) TOTAL GRADUATES (85-86 to 89-90)	(6) NEW HIRES (86-87 to 90-91)	(7) DIFFERENCE (5)-(6)	(8) RATIO (5)-(6)	(9) TOTAL GRADUATES (80-81 to 89-90)	(10) NEW HIRES (81-82 to 90-91)	(11) DIFFERENCE (9)-(10)	(12) RATIO (9)-(10)
ELEMENTARY												
K THRU 3	NA	3654	NA	NA	NA	6704	-6704	NA	NA	10358	NA	NA
4 THRU 6	NA	3191	NA	NA	NA	5637	-5637	NA	NA	8828	NA	NA
ELEMENTARY TOTAL	8580	6845	1735	1.25	7620	12341	-4721	0.62	16200	19186	-2986	0.84
K-12 SUBJECT AREAS												
SPEECH	24	7	17	3.43	6	5	1	1.20	30	12	18	2.50
READING	645	949	-304	0.68	345	439	-94	0.79	990	1388	-398	0.71
MUSIC	1340	819	521	1.64	1149	920	229	1.25	2489	1739	750	1.43
ART	536	426	110	1.26	408	508	-100	0.80	944	934	10	1.01
THEATER ARTS/DANCE/OTHER	91	77	14	1.18	83	93	-10	0.89	174	170	4	1.02
HEALTH/PHYSICAL ED.	3686	1112	2574	3.31	2961	1426	1535	2.08	6647	2538	4109	2.62
DRIVER EDUCATION	164	96	68	1.71	89	210	-121	0.42	253	306	-53	0.83
K-12 SUBJECT AREAS TOTAL	6487	3486	3001	1.86	5041	3601	1440	1.40	11528	7087	4441	1.63
MIDDLE GRADES/SECONDARY (7-12)												
ENGLISH	638	1833	-1195	0.35	632	2208	-1576	0.29	1270	4041	-2771	0.31
MATH/COMPUTER ED.	625	1782	-1157	0.35	747	1904	-1157	0.39	1372	3686	-2314	0.37
SCIENCE												
BIOLOGY	217	325	-108	0.67	185	268	-83	0.69	402	593	-191	0.68
CHEMISTRY	53	100	-47	0.53	38	183	-145	0.21	91	283	-192	0.32
PHYSICS	3	32	-29	0.09	6	70	-64	0.09	9	102	-93	0.09
GENERAL SCIENCE	520	913	-393	0.57	562	1056	-494	0.53	1082	1969	-887	0.55
SCIENCE TOTAL	792	1370	-578	0.58	791	1577	-786	0.50	1583	2947	-1364	0.54
SOCIAL STUDIES												
POLITICAL SCIENCE	13	190	-177	0.07	6	238	-232	0.03	19	428	-409	0.04
GEOGRAPHY	17	17	0	1.00	6	15	-9	0.40	23	32	-9	0.72
HISTORY	259	298	-39	0.87	198	278	-80	0.71	457	576	-119	0.79
ECONOMICS	4	19	-15	0.21	0	54	-54	0.00	4	73	-69	0.05
SOCIOLOGY	48	13	35	3.69	26	7	19	3.71	74	20	54	3.70
GENERAL SOCIAL STUDIES	256	529	-273	0.48	172	670	-498	0.26	428	1199	-771	0.36
SOCIAL STUDIES TOTAL	597	1066	-469	0.56	408	1262	-854	0.32	1005	2328	-1323	0.43
FOREIGN LANGUAGE												
FRENCH	65	134	-69	0.49	64	205	-141	0.31	129	339	-210	0.38
SPANISH	97	195	-98	0.50	128	251	-123	0.51	225	446	-221	0.50
GERMAN	10	14	-4	0.71	19	14	5	1.36	29	28	1	1.04
LATIN	6	41	-35	0.15	6	72	-66	0.08	12	113	-101	0.11
OTHER FOREIGN LANGUAGE	0	50	-50	0.00	0	58	-58	0.00	0	108	-108	0.00
FOREIGN LANGUAGE TOTAL	178	434	-256	0.41	217	600	-383	0.36	395	1034	-639	0.38
OTHER MIDDLE GRADES/SECONDARY	168	454	-286	0.37	64	646	-582	0.10	232	1100	-868	0.21
MIDDLE GRADES/SECONDARY TOTAL	2998	6939	-3941	0.43	2859	8197	-5338	0.35	5857	15136	-9279	0.39
VOCATIONAL EDUCATION												
AGRICULTURE	236	135	101	1.75	268	58	210	4.62	504	193	311	2.61
BUSINESS EDUCATION	32	370	-338	0.09	26	422	-396	0.06	58	792	-734	0.07
HOME ECONOMICS	397	259	138	1.53	383	167	216	2.29	780	426	354	1.83
MARKETING (DIST.) ED.	553	79	474	7.00	472	60	412	7.87	1025	139	886	7.37
TRADE & INDUSTRY	0	456	-456	0.00	0	271	-271	0.00	0	727	-727	0.00
HEALTH OCCUPATIONS	0	78	-78	0.00	0	65	-65	0.00	0	143	-143	0.00
PRE-VOCATIONAL	0	333	-333	0.00	0	226	-226	0.00	0	559	-559	0.00
INDUSTRIAL ARTS	690	164	526	4.21	836	172	664	4.86	1526	336	1190	4.54
VOCATIONAL HANDICAPPED	0	104	-104	0.00	0	156	-156	0.00	0	260	-260	0.00
OTHER VOCATIONAL	0	24	-24	0.00	0	1	-1	0.00	0	25	-25	0.00
ROTC	0	155	-155	0.00	0	175	-175	0.00	0	330	-330	0.00
VOCATIONAL EDUCATION TOTAL	1908	2157	-249	0.88	1984	1773	211	1.12	3892	3930	-38	0.99
EXCEPTIONAL CHILDREN												
MENTALLY HANDICAPPED	98	1061	-963	0.09	70	184	-114	0.38	168	1245	-1077	0.13
SPEECH IMPAIRED	540	489	51	1.10	421	528	-107	0.80	961	1017	-56	0.94
ACADEMICALLY GIFTED	3	355	-352	0.01	13	712	-699	0.02	16	1067	-1051	0.01
EMOTIONALLY HANDICAPPED	43	421	-378	0.10	89	293	-204	0.30	132	714	-582	0.18
HOMEBOUND/HOSPITALIZED	0	58	-58	0.00	0	8	-8	0.00	0	66	-66	0.00
LEARNING DISABLED	39	935	-896	0.04	57	1042	-985	0.05	96	1977	-1881	0.05
PHYSICALLY HANDICAPPED	0	46	-46	0.00	0	30	-30	0.00	0	76	-76	0.00
HEARING IMPAIRED	272	103	169	2.64	211	71	140	2.97	483	174	309	2.78
VISUALLY IMPAIRED	0	21	-21	0.00	0	42	-42	0.00	0	63	-63	0.00
OTHER EXCEPTIONALITIES	3355	277	3078	12.11	2540	1307	1233	1.94	5895	1584	4311	3.72
EXCEPTIONAL CHILDREN TOTAL	4350	3766	584	1.16	3401	4217	-816	0.81	7751	7983	-232	0.97
TOTAL	24322	23193	1129	1.05	20905	30129	-9224	0.69	45227	53322	-8095	0.85

* Based on augmented degrees conferred data for all years.
SOURCE: UNC-General Administration.

accurate predictions of shortages in each field, but rather to identify fields which will experience shortages if the production and distribution of new teachers is not altered to meet the demand for new teachers. It is hoped that, because of the projections, teacher output in fields projected to have shortages will rise. Thus, the success of these projections may be judged not by their accuracy as predictions, but by their ability to draw students to shortage areas, i.e., by their inaccuracy as predictions.

The cumulative number of new hires in Tables IV-B and IV-C are calculated by summing the numbers of new hires presented in Chapter II over each five-year period. During the projection period, the number of new hires overall is expected to increase from 4352 in 1986-87, to 6104 in 1987-88, to 6348 in 1988-89, to 6699 in 1989-90, and then to fall to 6626 in 1990-91. This means that except for the large increase between 1986-87 and 1987-88, the level of new hires is expected to be fairly constant for the five-year period. The data on new hires in both tables are identical.

In Tables IV-B and IV-C, two measures of shortage are used: the difference between the number of graduates and the number of new hires in each field (negative values indicate shortages), and the ratio of the number of graduates to the number of new hires in each field. The ratio may be interpreted either as the percentage of new positions which could be filled by new graduates, or as a measure of relative shortage in a particular field compared to the shortage overall in all fields.

Differences are presented in Columns 3, 7 and 11. Ratios are presented in Columns 4, 8 and 12.

Data for the past five years in Table IV-B reveal that there were 105 graduates for every 100 positions (new hires) available in the public school system. Fields with ratios below one indicate some shortage. Generally, low ratios indicate a potentially severe shortage, but in some cases the teacher deficit may be numerically small. This situation occurs, for example, in the fields of chemistry, physics, political science, economics, French, Spanish, and Latin. In other fields, the ratio is low and the teacher deficit is numerically large. This situation occurs in the fields of English, mathematics and computer education, general science, and general social studies. In some fields with ratios of zero, there are no graduates in that particular field, but instead there are graduates with degrees in more comprehensive fields such as special education or industrial arts who become certified to teach in those fields.

The system for classifying fields for graduates and new hires was imperfect at best, and the reader is generally advised to pay more attention to the totals for vocational educational and the education of exceptional children than to the individual fields within these categories. However, within these categories the fields of vocational business education, health occupations and vocational education of the handicapped, instruction of the mentally handicapped, academically gifted, emotionally handicapped, learning disabled, physically handicapped, visually impaired, and homebound/hospitalized all have low ratios.

Data for the coming five years reveal that only 69 graduates would be available for every 100 positions if new teacher output continues at the 1984-85 level. This means that an overall shortage is expected. Fields with above average shortages are those with ratios below .69. These include elementary education, art, driver education, English, mathematics and computer education, chemistry, physics, geography, political science, economics, sociology, French, Spanish, and Latin. Overall, no shortages are projected for vocational education or exceptional education. Obviously, elementary education, driver education and sociology are new shortage areas. In the past five years, each of these fields experienced large surpluses. Conversely, general science and general social studies show little evidence of a shortage in the coming five years although they appeared to be shortage areas in the past five years.

Perhaps the best indicator of shortage is the ratio of graduates to new hires over the entire ten-year period. These ratios are presented in Column 12. Overall, they suggest that by 1990-91, North Carolina's colleges and universities will have produced 85 graduates for every 100 positions. Fields with ratios below .85 include reading, English, mathematics, and computer education, chemistry, physics, general science, political science, geography, economics, general social studies, French, Spanish, and Latin. Past surpluses in the fields of elementary education, driver education and sociology cause these to drop from the list of shortage areas. The only fields with ratios below .85 that are not also fields with an above average

incidence of out-of-field teaching are chemistry, French and Spanish. This suggests that shortages in these fields may be less severe, although no less likely, than the data in Table IV-B indicate.

In the case of vocational education fields, shortages are projected in business education, health occupations, and vocational education of the handicapped. Teachers of trade and industry, pre-vocational courses and health occupations do not need a college degree to teach or be certified and are therefore not included on this list.

In the case of special education fields, there are some obvious inconsistencies between data on out-of-field teaching and those on graduates and new hires in Table IV-B. Out-of-field percentages for the total teaching work force are above average for each field in the exceptional children category, but Table IV-B data suggest that over the decade, 97 teachers have been produced for every 100 positions. Two explanations for this apparent inconsistency seem plausible. First, it is likely that most teachers of exceptional children are asked to teach more than one category of exceptional children even though they may not be certified to teach children in each category. This is particularly likely where the number of students in each category is low, schools are small and widely dispersed, and special education teachers are spread thin. In recent years, a new certificate in cross-categorical education has been developed to enable teachers to instruct those who are mentally or emotionally handicapped or learning disabled, but many teachers who work with

all three groups are only certified in one or two of these areas.

A second explanation seems equally plausible. The data in Chapter II show that the rapid growth in special education degrees occurred in the 1970's in response to shortages in those areas. In the 1980's, degrees in special education have decreased. The incidence of out-of-field teaching is most likely a legacy of the earlier shortages which are gradually being resolved by broader coverage in degree programs and by modification of certification areas to match these changes.

Instruction of the academically gifted is a field which shows a high incidence of out-of-field teaching and severe shortages in Table IV-B. In addition, it is fundamentally different from the other fields for exceptional children. The data suggest that this field which experienced shortages in the past and will continue to experience them. A deficit of 1051 teachers of the academically gifted is projected by 1990-91.

Conclusions: Projected Teacher Shortages

To summarize, the data on out-of-field teaching and projected supply/demand suggest that the following fields will experience shortages in the coming five years: reading, English, mathematics and computer education, chemistry, physics, general science, political science, geography, economics, general social studies, French, Spanish, Latin, vocational business education, vocational education of the handicapped, and instruction of the academically gifted and the homebound or hospitalized.

Conclusions about shortage areas are not changed by the supply data shown in Table IV-C. The primary differences in

Tables IV-B and IV-C are in the magnitudes of the shortages. In general, the magnitudes are greater in Table IV-C because there are fewer graduates with degrees in fields of shortage than there are graduates with the desire and intention to seek certification in those areas.

Fields Expected To Experience Severe Shortages

The severity of shortage in a given field may be gauged by comparing the size of the cumulative shortage over the 1980-81 to 1990-91 period with the reserve of currently certified persons who were not employed as public school teachers in 1985-86. These comparisons are made in Table IV-D. Fields in which the cumulative shortage exceeds the current reserve of persons certified to teach in those fields are designated as fields with severe shortages. This is because the shortage can be eliminated only by increasing the supply of new teacher education graduates in these fields, or by importing more from other states. The latter alternative is probably infeasible because the fields which will experience severe shortages in North Carolina will do so elsewhere as well. Therefore, the new supply must come from North Carolina's colleges and universities.

Fields in which shortages are likely to be severe are: mathematics and computer education, chemistry, physics, political science, economics, Latin, vocational handicapped, and instruction for the academically gifted and homebound/hospitalized. Teachers of the academically gifted show the largest overall deficit. Fields in which shortages are likely to be mild are: reading, English, general science,

TABLE IV-D
COMPARISONS OF TEN-YEAR CUMULATIVE SHORTAGES WITH THE RESERVE OF CERTIFIED PERSONS NOT TEACHING IN A NORTH CAROLINA PUBLIC SCHOOL IN 1985-86: SHORTAGE FIELDS ONLY

Field	Shortage (Col. 11, Table IV-B)	Persons With Valid Certificates (Table III-E)
Reading	401	1401
English	2282	5301
Math/Comp. Ed.	1902	1860
Chemistry	153	86
Physics	77	36
General Science	649	1491
Political Science	415	45
Geography	9	28
Economics	58	35
Gen'l Social Studies	352	4067
French	197	422
Spanish	211	330
Latin	79	53
Voc. Bus. Ed.	456	822
Vocational Handicapped	238	114
Academically Gifted	992	315
Homebound/Hospitalized	66	19

geography, general social studies, French, Spanish, and vocational business education.

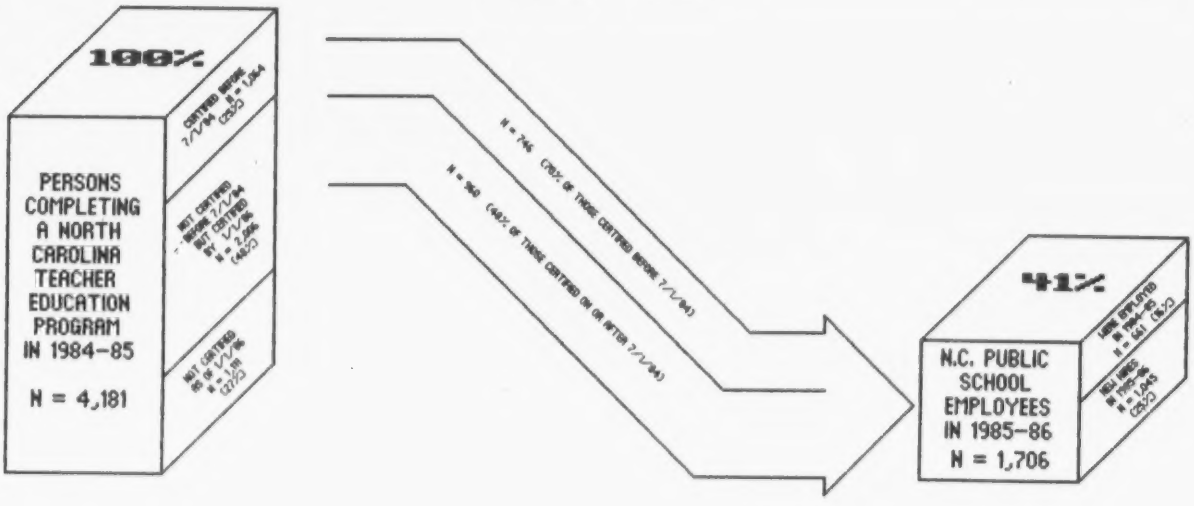
Entry into Public School Teaching in North Carolina

CPC Data on teacher supply for 1984-85 revealed that there were 4181 students who completed their teacher education program at a North Carolina college or university. How many of these became certified? How many were certified before concluding their program? How many entered teaching? How many chose not to teach?

Complete answers to these questions are impossible to discern from available data, but much has been learned by tracking CPC completers as they seek and obtain certification and then find a job in the North Carolina public schools. This path from college to classroom is visually depicted in Figure IV-A. The major conclusions drawn from the diagram are listed below it.

Recall that these CPC completers consisted of persons who earned baccalaureate or master's degrees in teacher education, or who completed the education course work needed to obtain certification, having previously earned a degree. Some were already certified to teach before starting a master's degree or a second baccalaureate degree and these, of course, were not new additions to the State's pool of teachers. Some sought certification and failed the NTE. Some sought certification only to provide a job alternative to the non-teaching career they pursued. Some sought certification but planned to delay entry into teaching. Some attended graduate schools. Some taught in a private school or in an out-of-state school. All of these

FIGURE IV-A. THE PATH IN NORTH CAROLINA FROM TEACHER EDUCATION PROGRAM TO EMPLOYMENT IN A PUBLIC SCHOOL: THE CLASS OF 1984-85


100%
PERSONS COMPLETING A NORTH CAROLINA TEACHER EDUCATION PROGRAM IN 1984-85
N = 4,181
N = 745
N = 960
N.C. PUBLIC SCHOOL EMPLOYEES IN 1985-86
N = 1,706

SIGNIFICANT CONCLUSIONS ABOUT THE 4,181 PERSONS COMPLETING A NORTH CAROLINA TEACHER EDUCATION PROGRAM IN 1984-85:

- Nearly three out of four (73%) were certified to teach in a N.C. public school as of 1/1/86.
- Four out of ten (41%) were employed in a N.C. public school in 1985-86.
- One out of four (25%) was employed as a new hire in a N.C. public school in 1985-86.
- About one out of two (48%) newly certified completers were employed in a N.C. public school in 1985-86.

outcomes help to rationalize the data in Figure IV-A.

Perhaps most surprising is the finding that only one in four (1045 out of 4181) completers became newly hired public school teachers in the year after graduation. This does not mean that three out of four did not teach, but it does mean that the effective new public school teacher yield rate was 25 percent. An additional 16 percent of the total (661 out of 4181) were teaching in 1985-86, but they had also been certified previously and were teaching in 1984-85 while they completed their programs. They were not new additions to the stock of public school teachers, but they were teachers. This finding highlights the in-service training function of teacher education programs. It means, however, that on average, 16 percent of the graduates in Tables IV-B and IV-C would not be available to fill new teaching positions.

The diagram also shows that 27 percent (1,111) of CPC completers did not obtain certification at all, and that only 960 of the 2006 (48 percent) who did obtain certification for the first time actually taught in a North Carolina public school in 1985-86. Furthermore, the diagram shows that 318 (1045-746) completers were certified before completing this program but did not teach in a North Carolina public school in 1985-86. No doubt some of this attrition is due to competition from private schools, out-of-state schools, or other labor markets, failure on NTE licensing exams, decisions to continue in school, or other factors, but the fact remains that North Carolina's colleges and universities needed to produce four teachers in order to get one

new one into a North Carolina public school the next year.

A second, independent source of data corroborates this finding. A survey of a sample of 1984 spring baccalaureate degree recipients from UNC institutions revealed that of 237 teacher education graduates, only 34 percent were teaching in a North Carolina public school one year later. In contrast to the CPC completers, none of 237 was previously certified to teach. Thus, the comparable yield rate from CPC data is obtained by dividing the 960 newly hired teachers who were not previously certified by the number of completers who were not previously certified, i.e., 3117. The result is 31 percent, only 3 percentage points below the 34 percent figure obtained from survey data.

The survey results are summarized in more detail in Table IV-E. They show that 15 percent of the graduates were teaching in a private or out-of-state school, 33 percent were not teaching at all, 9 percent were continuing their education, and 8 percent were neither employed nor continuing their education.

An important question for planning purposes is whether the public school teacher's yield rate of 25 percent overall, or 34 percent for baccalaureate recipients, is stable. There is some weak evidence concerning this question. In the report Classrooms Without Teachers?, it is noted that teacher education degrees increased 300 percent between 1960 and 1969 while the teacher work force increased by 48 percent between 1950 and 1970. The disparity in rates of growth is most likely due to a depletion of the stock of reserve teachers during the 1950's and

TABLE IV-E. ACTIVITIES OF A SAMPLE OF SPRING 1984 UNC BACHELOR'S DEGREE RECIPIENTS IN TEACHER EDUCATION ONE YEAR AFTER GRADUATION

	GRADUATES	% OF GRADUATES
TOTAL SAMPLE OF UNC GRADUATES WITH TEACHER EDUCATION DEGREES	237	100%
NOT EMPLOYED OR NOT CONTINUING EDUCATION		
HOMEMAKERS	5	2%
UNEMPLOYED-SEEKING WORK	8	3%
UNEMPLOYED-NOT SEEKING WORK	2	1%
NO ACTIVITY REPORTED	4	2%
SUBTOTAL: NOT EMPLOYED OR NOT CONTINUING EDUCATION	19	8%
CONTINUING EDUCATION	22	9%
EMPLOYED		
NON-TEACHING		
MILITARY	2	1%
OTHER NON-TEACHING	77	32%
SUBTOTAL: NON-TEACHING	79	33%
TEACHING		
NC PUBLIC SCHOOL	81	34%
NC PRIVATE SCHOOL	10	4%
OUT-OF-STATE	26	11%
SUBTOTAL: TEACHING	117	49%
SUBTOTAL: EMPLOYED	196	83%

SOURCE: Class of 1984 Survey of UNC College Graduates, UNC-General Administration.

1960's and a simultaneous need to increase the output of new teachers by three or four for every new teacher in the work force. A study by prepared in conjunction with The University's Teacher Education Review Programs, entitled The Teacher Market in North Carolina (Padilla, 1977), found a 42.5 percent yield rate, defined as the percentage of UNC bachelor's degree recipients in teacher education who were teaching in a North Carolina school one year after graduation. This figure is comparable to the 38 percent found in the 1984 survey mentioned above (including those who taught in a private school).

Logic suggests that changes in relative salaries, or the relative probabilities of obtaining a teaching job, or other factors affecting occupational choice can all cause changes in yield rates, but the extent of these changes cannot be predicted in a study such as this. As public school teacher salaries in North Carolina increase relative to those in competing jobs, or as announced teacher shortages spur some people to enter teaching instead of competing occupations, the yield rate may rise. Whether factors causing the rise will continue, and whether the rise will resolve teacher shortages overall and in particular fields, are both questions which require careful monitoring of the teacher labor market.

The Arithmetic of Projected Teacher Shortages During the Next Decade

The differences between new hires and teacher education graduates calculated in Tables IV-B and IV-C do not measure the increase in teacher education graduates needed to eliminate the shortages. This situation occurs because not all new hires are recent North Carolina teacher education graduates and not all recent North Carolina teacher education graduates become new hires in the succeeding year. In fact, 1985-86 data on new hires show that only 1045 of the total 5618 were 1984-85 North Carolina graduates. The remaining 4573 were drawn from the reserve stock of certified teachers who were not currently teaching in a North Carolina public school. In Chapter III, that stock was found to have more than 96,000 members below the age of 45. Each year it grows due to the addition of newly certified persons who do not teach in a North Carolina public school and due to currently employed teachers who stop teaching in a North Carolina public school[2]. It shrinks as its members die, retire, or accept teaching jobs in a North Carolina public school. It is expected that in times of teacher shortage, the stock will shrink as more of its members accept teaching jobs and fewer graduates decline teaching jobs. Given this shrinkage, it seems unlikely to expect that the number of teachers drawn from this stock each year will rise. Suppose it remains fixed at 4573 per year; then the stock would provide 22,865 teachers in each five-year period. The

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[2] Newly certified persons include new teachers immigrating from outside North Carolina and new teachers trained in North Carolina.

number of new hires in the next two five-year periods is projected to be 30,129 and 30,769 respectively. Thus, 7264 and 7904 positions would remain to be filled by new teacher education graduates in each of the two five-year periods. If the number of teacher education graduates remained fixed at 4181 per year, or 20,905 per five-year period, then the effective yield rate would need to increase from its present value of 25 percent to 35 and 38 percent, respectively, in the two five-year periods.

Suppose there were no change in the yield rate. Then in order to produce the 7,264 and 7,904 additional teachers, four times the number of graduates would be needed, i.e., 29,088 and 31,616. With only 20,905 being produced in each five-year period, the number of graduates would need to increase by 39 and 51 percent, respectively. In Chapter III, recent trend data on degrees conferred in education showed that changes of this magnitude are within the historical capacity of our colleges and universities.

Counter Arguments

A pessimist might assert that it is unreasonable to assume that a constant number of persons will be available from the existing reserve of certified persons since the excess demand for teachers will be long lasting and national in scope. A pessimist might also note that strengthened admissions standards, tougher licensing requirements, and raised performance evaluation standards will all act to reduce entry into teaching and to increase turnover. Finally, a pessimist might argue that fields with existing shortages have already demonstrated that there are

insufficient reserves to fill vacancies with appropriately trained teachers and these shortages can only get worse.

An optimist might assert that increases in teacher salaries and improvements in teacher's status and working conditions are already beginning to attract new teachers and reduce turnover, and that just the publicity about teacher shortages will attract still others. Witness the recent shortage of nurses! An optimist might also note that the decade of the 1960's revealed the capacity of colleges and universities to increase the output of teacher education graduates by 300 percent, far more than present and forecast conditions would necessitate. Finally, an optimist might assert that raising standards for teacher licensure and teacher retention will enrich the profession and draw increased numbers of better qualified teachers into it.

It is likely that neither view is entirely correct. Both reflect the considerable uncertainty surrounding teacher supply/demand projections ten years into the future.

V. THE CHANGING COMPOSITION OF THE TEACHER WORK FORCE

A profile of a work force can be viewed as a snapshot showing characteristics of the individuals who constitute the work force. Table V-A is a profile of the 1985-86 North Carolina public school teacher work force. Tables V-B and V-C are profiles of two subsets of the 1985-86 North Carolina teacher work force: the newly hired North Carolina public school teachers, and the newly hired North Carolina public school teachers who graduated in 1984-85 from a North Carolina institution of higher education, respectively. When these three profiles are viewed together, they are less like a snapshot and more like a segment of videotape depicting rapid and significant changes occurring in the composition of the North Carolina teacher work force.

Blacks made up 19.0 percent of the total public school teacher work force in 1985-86, but only 12.2 percent of the new hires that year. Among the new hires who had graduated in 1984-85 from a teacher preparation program in North Carolina, 8.9 percent were blacks. These figures indicate that a decrease in the proportion of blacks in the teacher work force of the State can be expected at least in the near term, and perhaps longer. The decline does not occur at the same rate across all teaching fields. For some fields, the decline is less rapid than it is for all fields taken together. For example, in 1985-86, 19 percent of vocational education teachers were black, 14.6 percent of the new hires were black, and 12.5 percent of newly graduated new

TABLE V-A. PROFILE OF THE NORTH CAROLINA PUBLIC SCHOOL TEACHER WORK FORCE FOR THE 1985-86 SCHOOL YEAR

TEACHING FIELD	TOTAL	PERCENT BLACK	PERCENT WHITE	PERCENT FEMALE	PERCENT MALE	PERCENT UNDER 25	PERCENT 25 to 34	PERCENT 35 to 44	PERCENT 45 to 54	PERCENT 55 & over	PERCENT MASTER'S +INC	PERCENT SCHOOL
ELEMENTARY												
K THRU 3	12790	21.3%	77.4%	99.0%	1.0%	2.3%	31.6%	35.8%	20.2%	10.1%	22.1%	88.7%
4 THRU 6	9640	21.2%	77.4%	91.4%	8.7%	2.8%	25.6%	39.4%	21.9%	10.2%	25.4%	86.0%
ELEMENTARY TOTAL	22430	21.3%	77.4%	95.7%	4.3%	2.5%	29.0%	37.3%	21.0%	10.1%	23.5%	87.5%
K-12 SUBJECT AREAS												
SPEECH	17	11.8%	88.2%	70.6%	29.4%	5.9%	35.3%	23.5%	29.4%	5.9%	29.4%	76.5%
READING	2093	23.2%	76.1%	95.3%	4.7%	2.7%	26.7%	36.9%	21.9%	11.7%	34.6%	84.2%
MUSIC	1452	15.6%	83.3%	63.0%	37.0%	6.9%	39.9%	28.0%	16.5%	9.2%	29.5%	80.0%
ART	740	12.6%	86.6%	78.4%	21.6%	2.3%	37.6%	43.1%	12.2%	4.9%	20.7%	82.4%
THEATER ARTS/DANCE/OTHER	113	8.9%	90.3%	72.6%	27.4%	6.2%	40.7%	36.3%	14.2%	2.7%	28.3%	77.0%
HEALTH/PHYSICAL ED.	2393	18.4%	81.0%	41.9%	58.1%	3.9%	39.8%	39.1%	13.2%	3.9%	23.6%	89.2%
DRIVER EDUCATION	473	19.5%	80.1%	7.0%	93.0%	0.4%	16.7%	33.4%	33.8%	15.6%	44.0%	94.9%
K-12 SUBJECT AREAS TOTAL	7281	18.5%	80.7%	63.5%	36.6%	3.7%	34.3%	36.2%	17.6%	8.1%	29.0%	85.4%
MIDDLE GRADES/SECONDARY (7-12)												
ENGLISH	5045	18.1%	80.9%	87.0%	13.0%	2.8%	24.3%	42.6%	20.2%	10.0%	27.7%	84.8%
MATH/COMPUTER ED.	3997	15.3%	83.2%	71.8%	28.2%	5.5%	32.6%	39.0%	15.2%	7.7%	24.9%	87.4%
SCIENCE												
BIOLOGY	816	18.0%	81.1%	56.6%	43.4%	3.8%	29.5%	36.5%	19.1%	10.9%	32.8%	85.7%
CHEMISTRY	262	12.2%	86.3%	54.6%	45.4%	2.7%	24.8%	43.5%	17.9%	11.1%	45.4%	81.7%
PHYSICS	85	4.7%	95.3%	41.2%	58.8%	2.4%	25.9%	31.8%	29.4%	10.6%	49.4%	83.5%
GENERAL SCIENCE	1839	17.6%	81.2%	59.9%	40.1%	5.2%	33.7%	34.2%	17.8%	9.1%	27.7%	85.4%
SCIENCE TOTAL	3002	16.9%	82.1%	58.0%	42.0%	4.5%	31.6%	35.5%	18.5%	9.8%	31.3%	85.1%
SOCIAL STUDIES												
POLITICAL SCIENCE	669	19.4%	79.4%	47.5%	52.5%	3.6%	29.6%	42.9%	17.5%	6.4%	26.0%	87.9%
GEOGRAPHY	38	5.3%	94.7%	39.5%	60.5%	0.0%	26.3%	39.5%	15.8%	18.4%	31.6%	97.4%
HISTORY	990	15.6%	84.0%	43.8%	56.2%	2.6%	25.0%	41.7%	21.2%	9.4%	31.2%	87.3%
ECONOMICS	41	9.8%	90.2%	34.2%	65.9%	9.8%	26.8%	31.7%	24.4%	7.3%	29.3%	82.9%
SOCIOLOGY	38	26.3%	73.7%	47.4%	52.6%	2.6%	7.9%	55.3%	15.8%	15.0%	39.5%	78.9%
GENERAL SOCIAL STUDIES	1090	21.0%	77.7%	56.5%	43.5%	2.9%	23.3%	46.9%	18.6%	8.3%	26.6%	88.6%
SOCIAL STUDIES TOTAL	2866	18.5%	80.6%	49.4%	50.6%	3.0%	25.2%	44.0%	19.3%	8.4%	28.3%	87.9%
FOREIGN LANGUAGE												
FRENCH	326	12.9%	86.5%	85.0%	15.0%	2.8%	22.1%	49.7%	16.6%	8.6%	30.7%	84.7%
SPANISH	417	6.0%	79.1%	81.8%	18.2%	3.4%	25.9%	41.3%	15.4%	14.2%	29.0%	75.9%
GERMAN	36	2.8%	97.2%	69.4%	30.6%	0.0%	5.6%	47.2%	27.8%	19.4%	52.8%	55.6%
LATIN	65	0.0%	100.0%	80.0%	20.0%	12.3%	27.7%	29.2%	20.0%	10.8%	33.8%	75.4%
OTHER FOREIGN LANGUAGE	51	13.7%	80.4%	84.3%	15.7%	5.9%	31.4%	45.1%	9.8%	7.8%	27.5%	78.4%
FOREIGN LANGUAGE TOTAL	895	8.4%	84.1%	82.5%	17.5%	3.8%	24.1%	43.9%	16.3%	11.7%	30.8%	77.4%
OTHER MIDDLE GRADES/SECONDARY	742	25.2%	73.2%	48.8%	51.2%	7.4%	31.9%	38.4%	15.9%	6.1%	32.3%	80.2%
MIDDLE GRADES/SECONDARY TOTAL	16547	17.0%	81.5%	69.6%	30.4%	4.1%	28.1%	40.6%	18.1%	9.1%	28.2%	85.4%
VOCATIONAL EDUCATION												
AGRICULTURE	338	14.8%	84.6%	7.7%	92.3%	5.6%	34.0%	23.4%	24.3%	12.4%	35.2%	87.6%
BUSINESS EDUCATION	1284	24.5%	74.6%	88.3%	11.7%	1.2%	16.0%	39.3%	30.8%	12.7%	26.9%	90.5%
HOME ECONOMICS	847	20.1%	78.6%	99.2%	0.8%	1.5%	26.2%	34.2%	23.0%	15.0%	23.1%	88.0%
MARKETING/DIST. ED.	93	6.5%	92.5%	59.1%	40.9%	4.3%	25.8%	36.6%	20.4%	12.9%	31.2%	82.8%
TRADE & INDUSTRY	1089	14.9%	84.9%	7.5%	92.5%	0.6%	16.8%	34.7%	25.6%	20.8%	9.9%	39.6%
HEALTH OCCUPATIONS	154	6.5%	93.5%	99.4%	0.7%	0.7%	14.9%	31.8%	38.3%	13.6%	4.5%	28.6%
PRE-VOCATIONAL	657	20.6%	78.2%	63.9%	36.1%	3.2%	28.6%	38.1%	16.6%	13.4%	21.5%	86.0%
INDUSTRIAL ARTS	312	18.0%	82.1%	7.7%	92.3%	6.7%	34.6%	29.8%	17.3%	11.2%	24.7%	84.9%
VOCATIONAL HANDICAPPED	192	24.5%	75.0%	63.5%	36.5%	2.6%	27.6%	37.5%	16.7%	15.6%	31.8%	83.9%
OTHER VOCATIONAL	32	15.6%	84.4%	68.8%	31.3%	3.1%	28.1%	37.5%	28.1%	3.1%	31.3%	68.8%
ROTC	107	14.0%	81.3%	0.0%	100.0%	2.8%	9.4%	8.4%	51.4%	28.0%	26.2%	12.1%
VOCATIONAL EDUCATION TOTAL	5105	19.0%	80.1%	56.4%	43.6%	2.2%	22.3%	34.7%	25.3%	15.2%	22.0%	74.1%
EXCEPTIONAL CHILDREN												
MENTALLY HANDICAPPED	1652	26.0%	73.1%	88.4%	11.6%	5.0%	44.0%	27.8%	12.8%	10.4%	31.1%	85.5%
SPEECH IMPAIRED	618	14.4%	85.3%	97.4%	2.6%	4.7%	51.9%	28.2%	10.5%	4.5%	60.7%	77.7%
ACADEMICALLY GIFTED	888	5.2%	94.7%	88.9%	11.2%	2.6%	21.7%	46.1%	22.3%	7.2%	45.5%	80.4%
EMOTIONALLY HANDICAPPED	422	14.2%	84.4%	86.5%	13.5%	9.7%	53.1%	28.7%	6.2%	2.4%	41.9%	73.5%
HOMEBOUND/HOSPITALIZED	91	12.1%	85.7%	86.8%	13.2%	1.1%	22.0%	34.1%	23.1%	19.8%	47.3%	85.5%
LEARNING DISABLED	1559	16.4%	82.9%	92.0%	8.0%	4.0%	50.5%	30.1%	10.8%	4.5%	38.7%	82.4%
PHYSICALLY HANDICAPPED	60	3.3%	96.7%	91.7%	8.3%	5.0%	41.7%	26.7%	13.3%	13.3%	33.3%	71.7%
HEARING IMPAIRED	104	8.7%	90.4%	97.1%	2.9%	10.6%	67.3%	13.5%	6.7%	1.9%	35.6%	76.9%
VISUALLY IMPAIRED	24	12.5%	87.5%	95.8%	4.2%	4.2%	29.2%	29.2%	29.2%	8.3%	29.2%	58.3%
OTHER EXCEPTIONALITIES	963	18.5%	80.7%	92.6%	7.4%	4.8%	49.5%	31.2%	9.8%	4.8%	35.4%	81.7%
EXCEPTIONAL CHILDREN TOTAL	6381	17.0%	82.3%	90.9%	9.1%	4.7%	44.7%	31.3%	12.6%	6.6%	39.5%	81.5%
TOTAL	57744	19.0%	79.8%	80.2%	19.9%	3.3%	30.6%	37.2%	19.2%	9.6%	27.2%	84.8%

SOURCE: State Department of Public Instruction.

TABLE V-8. PROFILE OF NEWLY HIRED NORTH CAROLINA PUBLIC SCHOOL TEACHERS FOR THE 1985-86 SCHOOL YEAR

TEACHING FIELD	TOTAL	PERCENT BLACK	PERCENT WHITE	PERCENT FEMALE	PERCENT MALE	PERCENT UNDER 25	PERCENT 25 to 34	PERCENT 35 to 44	PERCENT 45 to 54	PERCENT 55 & OVER	PERCENT MASTER'S +INC	PERCENT SCHOOL
ELEMENTARY												
K THRU 3	884	14.7%	84.5%	98.6%	1.4%	22.0%	48.6%	24.0%	4.6%	0.8%	13.5%	76.4%
4 THRU 6	776	11.5%	87.5%	93.2%	6.8%	22.2%	38.0%	32.9%	5.8%	1.2%	16.4%	65.7%
ELEMENTARY TOTAL	1660	13.2%	85.9%	96.1%	3.9%	22.1%	43.7%	28.1%	5.2%	1.0%	14.8%	71.4%
K-12 SUBJECT AREAS												
SPEECH	2	0.0%	100.0%	50.0%	50.0%	0.0%	50.0%	0.0%	50.0%	0.0%	0.0%	100.0%
READING	232	11.6%	87.1%	96.1%	3.9%	16.8%	41.8%	31.9%	7.8%	1.7%	24.1%	71.6%
MUSIC	184	10.9%	88.0%	66.9%	33.2%	37.0%	41.3%	16.9%	4.4%	0.5%	20.7%	73.4%
ART	80	8.8%	90.0%	80.0%	20.0%	17.5%	46.3%	27.5%	7.5%	1.3%	13.8%	71.3%
THEATER ARTS/DANCE/OTHER	21	4.8%	95.2%	71.4%	28.6%	23.8%	52.4%	19.1%	0.0%	4.8%	23.8%	47.6%
HEALTH/PHYSICAL ED.	219	17.4%	82.2%	46.1%	53.9%	34.7%	52.1%	11.0%	2.3%	0.0%	12.8%	76.7%
DRIVER EDUCATION	15	6.7%	93.3%	6.7%	93.3%	6.7%	46.7%	33.3%	6.7%	6.7%	13.3%	93.3%
K-12 SUBJECT AREAS TOTAL	753	12.5%	86.6%	70.1%	29.9%	27.0%	45.6%	21.3%	5.2%	1.1%	18.6%	73.3%
MIDDLE GRADES/SECONDARY (7-12)												
ENGLISH	542	9.4%	89.3%	86.0%	14.0%	17.7%	37.3%	35.4%	8.3%	1.3%	20.5%	70.8%
MATH/COMPUTER ED.	493	8.5%	89.7%	74.2%	25.8%	29.0%	38.9%	24.5%	6.1%	1.8%	16.4%	76.5%
SCIENCE												
BIOLOGY	81	6.2%	92.6%	61.7%	38.3%	23.5%	44.4%	25.9%	4.9%	1.2%	38.3%	65.4%
CHEMISTRY	22	9.1%	90.9%	63.6%	36.4%	18.2%	45.5%	31.8%	4.6%	0.0%	36.4%	72.7%
PHYSICS	9	0.0%	100.0%	22.2%	77.8%	11.1%	22.2%	22.2%	33.3%	11.1%	77.8%	66.7%
GENERAL SCIENCE	268	7.5%	89.9%	72.4%	27.6%	26.9%	40.7%	22.4%	7.5%	2.6%	19.0%	71.6%
SCIENCE TOTAL	380	7.1%	90.8%	68.4%	31.6%	25.3%	41.3%	23.7%	7.4%	2.4%	25.5%	70.3%
SOCIAL STUDIES												
POLITICAL SCIENCE	90	11.1%	88.9%	63.3%	36.7%	18.9%	47.8%	25.6%	5.6%	2.2%	18.9%	71.1%
GEOGRAPHY	3	0.0%	100.0%	0.0%	100.0%	0.0%	66.7%	33.3%	0.0%	0.0%	33.3%	66.7%
HISTORY	79	8.9%	91.1%	55.7%	44.3%	17.7%	45.6%	26.6%	7.6%	2.5%	21.5%	74.7%
ECONOMICS	7	0.0%	100.0%	28.6%	71.4%	42.9%	42.9%	14.3%	0.0%	0.0%	14.3%	100.0%
SOCIOLOGY	3	0.0%	100.0%	33.3%	66.7%	33.3%	33.3%	33.3%	0.0%	0.0%	33.3%	33.3%
GENERAL SOCIAL STUDIES	121	14.1%	86.0%	64.5%	35.5%	17.4%	32.2%	42.2%	8.3%	0.0%	16.5%	77.7%
SOCIAL STUDIES TOTAL	303	11.2%	88.8%	60.1%	39.9%	18.5%	40.9%	32.3%	6.9%	1.3%	18.8%	74.9%
FOREIGN LANGUAGE												
FRENCH	28	10.7%	89.3%	67.9%	32.1%	21.4%	25.0%	46.4%	3.6%	3.6%	28.6%	50.0%
SPANISH	69	5.8%	79.7%	87.0%	13.0%	13.0%	36.2%	30.4%	8.7%	11.6%	23.2%	47.8%
GERMAN	6	0.0%	100.0%	50.0%	50.0%	0.0%	16.7%	50.0%	0.0%	33.3%	50.0%	33.3%
LATIN	14	0.0%	100.0%	64.3%	35.7%	50.0%	21.4%	7.1%	21.4%	0.0%	21.4%	71.4%
OTHER FOREIGN LANGUAGE	15	0.0%	86.7%	86.7%	13.3%	13.3%	40.0%	33.3%	6.7%	6.7%	26.7%	60.0%
FOREIGN LANGUAGE TOTAL	132	5.3%	85.6%	78.8%	21.2%	18.2%	31.8%	32.6%	8.3%	9.1%	25.8%	51.5%
OTHER MIDDLE GRADES/SECONDARY	204	26.5%	73.0%	47.1%	52.9%	24.5%	40.2%	29.4%	4.4%	1.5%	22.5%	70.6%
MIDDLE GRADES/SECONDARY TOTAL	2054	10.5%	87.7%	71.8%	28.2%	22.6%	38.8%	29.4%	7.0%	2.1%	20.7%	71.4%
VOCATIONAL EDUCATION												
AGRICULTURE	23	17.4%	82.6%	8.7%	91.3%	52.2%	30.4%	8.7%	8.7%	0.0%	26.1%	69.6%
BUSINESS EDUCATION	83	15.7%	84.3%	84.3%	15.7%	12.1%	27.7%	39.8%	20.5%	0.0%	32.5%	72.3%
HOME ECONOMICS	52	11.5%	86.5%	100.0%	0.0%	13.5%	51.9%	19.2%	9.6%	5.8%	19.2%	71.2%
MARKETING/DIST. ED.	7	14.3%	85.7%	85.7%	14.3%	42.9%	14.3%	28.6%	14.3%	0.0%	14.3%	42.9%
TRADE & INDUSTRY	75	18.7%	81.3%	9.3%	90.7%	6.7%	42.7%	36.0%	12.0%	2.7%	6.7%	30.7%
HEALTH OCCUPATIONS	16	6.3%	93.8%	100.0%	0.0%	0.0%	31.3%	50.0%	18.8%	0.0%	6.3%	25.0%
PRE-VOCATIONAL	62	9.7%	90.3%	69.4%	30.7%	22.6%	46.8%	12.9%	9.7%	8.1%	24.2%	74.2%
INDUSTRIAL ARTS	38	15.8%	84.2%	13.2%	86.8%	31.6%	34.2%	15.2%	15.8%	5.3%	10.5%	71.1%
VOCATIONAL HANDICAPPED	11	18.2%	81.8%	81.8%	18.2%	18.2%	45.5%	27.3%	9.1%	0.0%	18.2%	81.8%
OTHER VOCATIONAL	8	25.0%	75.0%	75.0%	25.0%	0.0%	25.0%	62.5%	12.5%	0.0%	25.0%	62.5%
ROTC	35	14.3%	82.9%	0.0%	100.0%	5.7%	28.6%	17.1%	42.9%	5.7%	8.6%	2.9%
VOCATIONAL EDUCATION TOTAL	410	14.6%	84.9%	52.7%	47.3%	16.3%	37.6%	26.6%	16.1%	3.4%	18.5%	56.3%
EXCEPTIONAL CHILDREN												
MENTALLY HANDICAPPED	151	12.6%	85.4%	89.4%	10.6%	33.1%	45.7%	18.5%	2.0%	0.7%	19.2%	70.9%
SPEECH IMPAIRED	85	17.7%	81.2%	100.0%	0.0%	27.1%	56.5%	12.9%	2.4%	1.2%	69.9%	72.9%
ACADEMICALLY GIFTED	77	2.6%	97.4%	90.9%	9.1%	18.2%	28.6%	39.0%	10.4%	3.9%	35.1%	58.4%
EMOTIONALLY HANDICAPPED	86	9.3%	88.4%	83.7%	16.3%	50.9%	44.2%	18.6%	1.2%	1.2%	31.4%	62.8%
HOMEBOUND/HOSPITALIZED	3	0.0%	100.0%	100.0%	0.0%	33.3%	66.7%	0.0%	0.0%	0.0%	33.3%	100.0%
LEARNING DISABLED	163	16.0%	82.2%	96.9%	3.1%	24.5%	58.3%	14.7%	1.8%	0.6%	24.5%	68.1%
PHYSICALLY HANDICAPPED	11	0.0%	100.0%	100.0%	0.0%	27.3%	45.5%	18.2%	9.1%	0.0%	27.3%	36.4%
HEARING IMPAIRED	23	8.7%	91.3%	100.0%	0.0%	26.1%	69.2%	4.4%	4.4%	0.0%	34.8%	69.2%
VISUALLY IMPAIRED	4	0.0%	100.0%	100.0%	0.0%	25.0%	0.0%	50.0%	25.0%	0.0%	25.0%	25.0%
OTHER EXCEPTIONALITIES	138	17.4%	81.9%	92.8%	7.3%	21.0%	56.5%	18.8%	3.6%	0.0%	26.8%	71.0%
EXCEPTIONAL CHILDREN TOTAL	741	13.0%	85.7%	93.0%	7.0%	26.6%	50.2%	18.9%	3.4%	0.9%	30.9%	67.5%
TOTAL	5618	12.2%	86.6%	80.1%	19.9%	23.1%	42.6%	26.3%	6.4%	1.6%	19.9%	70.0%

SOURCE: State Department of Public Instruction.

TABLE V-C. PROFILE OF 1984-85 NORTH CAROLINA TEACHER EDUCATION GRADUATES WHO WERE EMPLOYED IN NORTH CAROLINA PUBLIC SCHOOLS IN 1985-86

TEACHING FIELD	TOTAL	PERCENT BLACK	PERCENT WHITE	PERCENT FEMALE	PERCENT MALE	PERCENT UNDER 25	PERCENT 25 to 34	PERCENT 35 to 44	PERCENT 45 to 54	PERCENT 55 & over	PERCENT MASTER'S +INC	PERCENT SCHOOLS
ELEMENTARY												
K THRU 3	137	13.9%	83.9%	98.5%	1.5%	64.2%	24.1%	8.0%	3.6%	0.0%	8.8%	100.0%
4 THRU 6	120	10.8%	89.2%	91.7%	8.3%	69.2%	19.2%	10.0%	0.8%	0.8%	6.7%	100.0%
ELEMENTARY TOTAL	257	12.5%	86.4%	95.3%	4.7%	66.5%	21.8%	8.9%	2.3%	0.4%	7.8%	100.0%
K-12 SUBJECT AREAS												
SPEECH	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
READING	33	6.1%	90.9%	90.9%	9.1%	51.5%	30.3%	15.2%	3.0%	0.0%	18.2%	100.0%
MUSIC	38	7.9%	92.1%	55.3%	44.7%	78.9%	21.1%	0.0%	0.0%	0.0%	18.4%	100.0%
ART	13	0.0%	100.0%	84.6%	15.4%	46.2%	53.8%	0.0%	0.0%	0.0%	7.7%	100.0%
THEATER ARTS/DANCE/OTHER	1	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
HEALTH/PHYSICAL ED.	44	18.2%	79.5%	31.8%	68.2%	81.8%	18.2%	0.0%	0.0%	0.0%	11.4%	100.0%
DRIVER EDUCATION	2	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	0.0%	0.0%	50.0%	100.0%
K-12 SUBJECT AREAS TOTAL	131	10.7%	87.8%	58.8%	41.2%	68.7%	26.7%	3.8%	0.8%	0.0%	15.3%	100.0%
MIDDLE GRADES/SECONDARY (7-12)												
ENGLISH	98	11.2%	88.8%	80.6%	19.4%	59.2%	24.5%	14.3%	2.0%	0.0%	12.2%	100.0%
MATH/COMPUTER ED.	134	4.5%	94.0%	75.4%	24.6%	64.2%	29.1%	4.5%	1.5%	0.7%	9.0%	100.0%
SCIENCE												
BIOLOGY	21	0.0%	100.0%	66.7%	33.3%	42.9%	52.4%	4.8%	0.0%	0.0%	38.1%	100.0%
CHEMISTRY	6	0.0%	100.0%	66.7%	33.3%	83.3%	16.7%	0.0%	0.0%	0.0%	16.7%	100.0%
PHYSICS	2	0.0%	100.0%	50.0%	50.0%	50.0%	50.0%	0.0%	0.0%	0.0%	100.0%	100.0%
GENERAL SCIENCE	83	2.4%	96.4%	72.3%	27.7%	54.2%	30.1%	10.8%	3.6%	1.2%	13.3%	100.0%
SCIENCE TOTAL	112	1.8%	97.3%	70.5%	29.5%	53.6%	33.9%	8.9%	2.7%	0.9%	19.6%	100.0%
SOCIAL STUDIES												
POLITICAL SCIENCE	19	5.3%	94.7%	57.9%	42.1%	52.6%	31.6%	15.8%	0.0%	0.0%	21.1%	100.0%
GEOGRAPHY	1	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
HISTORY	8	0.0%	100.0%	25.0%	75.0%	50.0%	37.5%	12.5%	0.0%	0.0%	25.0%	100.0%
ECONOMICS	2	0.0%	100.0%	0.0%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
SOCIOLOGY	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
GENERAL SOCIAL STUDIES	25	8.0%	92.0%	60.0%	40.0%	40.0%	28.0%	24.0%	8.0%	0.0%	8.0%	100.0%
SOCIAL STUDIES TOTAL	55	5.5%	94.5%	52.7%	47.3%	47.3%	30.9%	18.2%	3.6%	0.0%	14.5%	100.0%
FOREIGN LANGUAGE												
FRENCH	5	0.0%	100.0%	40.0%	60.0%	60.0%	20.0%	20.0%	0.0%	0.0%	20.0%	100.0%
SPANISH	7	0.0%	100.0%	85.7%	14.3%	71.4%	28.6%	0.0%	0.0%	0.0%	28.6%	100.0%
GERMAN	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LATIN	5	0.0%	100.0%	80.0%	20.0%	80.0%	0.0%	0.0%	20.0%	0.0%	0.0%	100.0%
OTHER FOREIGN LANGUAGE	2	0.0%	100.0%	100.0%	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	50.0%	100.0%
FOREIGN LANGUAGE TOTAL	19	0.0%	100.0%	73.7%	26.3%	68.4%	21.1%	5.3%	5.3%	0.0%	21.1%	100.0%
OTHER MIDDLE GRADES/SECONDARY	28	14.3%	82.1%	42.9%	57.1%	64.3%	28.6%	7.1%	0.0%	0.0%	7.1%	100.0%
MIDDLE GRADES/SECONDARY TOTAL	446	5.8%	93.3%	70.4%	29.6%	58.5%	29.1%	9.6%	2.2%	0.4%	13.5%	100.0%
VOCATIONAL EDUCATION												
AGRICULTURE	8	25.0%	75.0%	12.5%	87.5%	87.5%	12.5%	0.0%	0.0%	0.0%	37.5%	100.0%
BUSINESS EDUCATION	10	20.0%	80.0%	70.0%	30.0%	20.0%	50.0%	30.0%	0.0%	0.0%	20.0%	100.0%
HOME ECONOMICS	7	0.0%	100.0%	100.0%	0.0%	71.4%	28.6%	0.0%	0.0%	0.0%	14.3%	100.0%
MARKETING/DIST. ED.	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
TRADE & INDUSTRY	8	0.0%	100.0%	0.0%	100.0%	37.5%	37.5%	25.0%	0.0%	0.0%	12.5%	100.0%
HEALTH OCCUPATIONS	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
PRE-VOCATIONAL	12	0.0%	100.0%	83.3%	16.7%	66.7%	16.7%	16.7%	0.0%	0.0%	25.0%	100.0%
INDUSTRIAL ARTS	13	23.1%	76.9%	23.1%	76.9%	69.2%	15.4%	7.7%	7.7%	0.0%	15.4%	100.0%
VOCATIONAL HANDICAPPED	6	16.7%	83.3%	100.0%	0.0%	50.0%	33.3%	0.0%	16.7%	0.0%	0.0%	100.0%
OTHER VOCATIONAL	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ROTC	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VOCATIONAL EDUCATION TOTAL	64	12.5%	87.5%	53.1%	46.9%	57.8%	26.6%	12.5%	3.1%	0.0%	18.8%	100.0%
EXCEPTIONAL CHILDREN												
MENTALLY HANDICAPPED	32	12.5%	81.3%	96.9%	3.1%	78.1%	15.6%	6.3%	0.0%	0.0%	6.3%	100.0%
SPEECH IMPAIRED	15	0.0%	100.0%	100.0%	0.0%	66.7%	26.7%	6.7%	0.0%	0.0%	80.0%	100.0%
ACADEMICALLY GIFTED	11	0.0%	100.0%	90.9%	9.1%	81.8%	18.2%	0.0%	0.0%	0.0%	9.1%	100.0%
EMOTIONALLY HANDICAPPED	19	5.3%	94.7%	84.2%	15.8%	57.9%	31.6%	10.5%	0.0%	0.0%	21.1%	100.0%
HOMEBOUND/HOSPITALIZED	2	0.0%	100.0%	100.0%	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	50.0%	100.0%
LEARNING DISABLED	38	10.5%	84.2%	100.0%	0.0%	57.9%	31.6%	10.5%	0.0%	0.0%	13.2%	100.0%
PHYSICALLY HANDICAPPED	3	0.0%	100.0%	100.0%	0.0%	66.7%	33.3%	0.0%	0.0%	0.0%	0.0%	100.0%
HEARING IMPAIRED	4	0.0%	100.0%	100.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
VISUALLY IMPAIRED	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
OTHER EXCEPTIONALITIES	23	17.4%	82.6%	91.3%	8.7%	65.2%	30.4%	4.3%	0.0%	0.0%	21.7%	100.0%
EXCEPTIONAL CHILDREN TOTAL	147	8.8%	88.4%	95.2%	4.8%	67.3%	25.9%	6.8%	0.0%	0.0%	20.4%	100.0%
TOTAL	1045	8.9%	89.9%	77.5%	22.5%	63.0%	26.4%	8.5%	1.8%	0.3%	13.6%	100.0%

SOURCE: State Department of Public Instruction.

hires were black. On the other hand, the proportion of blacks in mathematics/computer education, 15.3 percent, was lower than the overall proportion of blacks in the 1985-86 teacher work force, and it decreased to 8.5 percent among new hires and 4.5 percent among newly graduated new hires. For foreign language teachers taken as a group, the comparable figures were 8.4 percent, 5.3 percent and 0.0 percent, respectively. For all science teachers, taken as a group,the comparable figures were 16.9 percent, 7.1 percent, and 1.8 percent respectively. Only two of the newly graduated science teachers who were hired by a North Carolina public school in 1985-86 were black.

The balance between the total numbers of men and women in the teacher work force does not show evidence of changing as significantly as the balance between blacks and whites. Women represented 80.1 percent of the new hires and 80.2 percent of the 1985-86 teacher work force. Among the newly graduated new hires, 77.5 percent were women. About 95 percent of teachers in the in the elementary grades and about 70 percent of teachers in grades 7-12 were women in 1985-86. The three profiles show no change in these figures.

Some indication of changes in the gender composition of the teacher work force can be found in particular fields, such as science, mathematics/computers, and exceptional children. In each case the proportion of women increased. The increase was greatest among science teachers where 58.0 percent were women in 1985-86, 68.4 percent of the new hires were women, and 70.5 percent of the newly graduated new hires were female. A similar

pattern can be observed in the case of female mathematics/computer teachers who increased from 71.8 percent, to 74.2 percent, to 75.4 percent in the three comparison groups; and among female teachers of exceptional children who increased from 90.9 percent, to 93.0 percent, to 95.2 percent.

About 85 percent of North Carolina teachers employed in 1985-86 received some training for certification in a North Carolina teacher preparation program. By contrast, 70 percent of the new hires in the same year received some training for certification in a North Carolina teacher preparation program. This difference indicates that the public schools are increasing their reliance on persons educated outside of the State.

Summary

To summarize, a comparison of the data in Tables V-A, V-B, and V-C reveals several probable changes in the profile of the North Carolina public school teacher work force. If the trends indicated in the data continue, the State can expect a decrease in the percentage of black teachers in the teacher work force overall, and a particularly large decrease in certain teaching fields, particularly those where shortages are likely to occur. Women will account for a larger proportion science, mathematics/computer, and exceptional children teachers. North Carolina institutions of higher education will be preparing a smaller percentage of the personnel needed to staff the State's classrooms.

VI. CONCLUSIONS AND RECOMMENDATIONS

Given this study's forecast of teacher staff levels, turnover, and new hires, and given its assumption that conditions affecting teacher supply in North Carolina will remain as they were in 1984-85, then North Carolina can expect a cumulative shortage of 2,039 teachers between 1986-87 and 1990-91, and a cumulative shortage of 2,679 teachers between 1991-92 and 1995-96. But these "givens" are far from certain. Analysis of supply and demand projections reveals that these shortages could be eliminated by any one of the following events:

1. a reduction in the projected annual teacher turnover rates of one percentage point or more.
2. an increase of 39 and 51 percent per year respectively, in the number of new teacher education graduates during the next two five-year periods.
3. an increase in the new teacher yield rate from 25 percent to 35 percent.
4. an increase of 408 or more per year in the number of reserve teachers who enter public school teaching after an absence or after having taught in another state, or
5. a delay in the implementation schedule for the Basic Education Program.

Data on past trends in education degrees conferred suggest that expanded output of new teachers is clearly within the historic capacity of North Carolina's colleges and universities

as demonstrated by the fact that the number of such degrees has decreased by 38 percent during the last decade. Also, the needed increase in new teacher education graduates is small compared to the increase of almost 300 percent which occurred nationwide between 1960 and 1969. All things considered, therefore, it is reasonable to assume that North Carolina can eliminate teacher shortages in the aggregate by adopting policies which encourage any of the five events above to occur.

Teacher shortages in certain teaching fields are likely to remain, however, long after shortages in the aggregate have been eliminated. This is because many fields in which shortages are projected to occur during the next five years have experienced shortages already. In fact, in fields which are projected to experience severe shortages, the size of the shortage exceeds the 1985-86 count of persons who are certified in these fields but are not presently employed by a North Carolina public school.

Recommendations

In general, policies which increase enrollments in teacher education programs, raise the yield rates of their graduates, reduce turnover rates for currently employed teachers, or encourage entry or reentry into teaching from the reserve of currently certified prsons who are not currently employed by a North Carolina public school, can all reduce teacher shortages. In addition, the publication of timely projections of teacher supply and demand can by itself help to reduce teacher shortages. Such projections provide needed information to students about prospective job opportunities, which raises their expected

earnings from a teaching job. This expectation occurs not because graduates anticipate the need to increase salaries to reduce shortages, but because the chances are increased that graduates will find a job in their field following graduation. However, publication of supply/demand studies alone cannot eliminate shortages. The following recommendations are presented in order of increasing costs.

1. A data system to monitor carefully the number of students in the teacher education pipeline and their entry into teaching needs to be continued and strengthened. Such a system was begun in 1984-85 and supports much of the analysis contained in this report. Without it, the impact of many Task Force recommendations on teacher supply could not be gauged. The system should include data on failure rates on teacher licensing exams.
2. Projections of teacher supply and demand should be prepared biennially, in time to support any new legislative initiatives to deal with identifiable teacher shortages. Such reports should present data on the incidence of out-of-field teaching by field.
3. The State Board of Education should expand its computerized job matching service in order to link new teacher education graduates with position vacancies in every North Carolina public school.
4. The State Board of Education should consider recruiting teachers with certification in shortage areas who are not presently employed by a North Carolina public school by

writing to them directly. The correspondence should seek to update and verify file data, determine present employment status, and provide information about current shortage areas and any programs which might support the person's entry or reentry into public school teaching.

5. The State Board of Education should consider the feasibility of surveying a sample of currently employed public school teachers to determine which factors amenable to state policy could be changed in order to increase teacher satisfaction and reduce turnover.

6. The State Board of Education should give strong consideration to devising a salary scale which provides for stipends to be paid to teachers in fields which are officially designated as shortage fields. The stipend should be paid on that portion of a teacher's course load which is in a shortage field and should last only as long as the most recent biennial supply/demand report indicates that the field is a shortage field.

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APPENDIXES

Appendix A

Out-of-Field Teaching

As noted in the text, one indicator of teacher shortage in particular fields would be the relative occurrence of out-of-field teaching. If it is difficult to find teachers for a certain field, it is reasonable to expect that teachers not certified in that field will be used relatively often to fill vacancies in the field.

A measure of the magnitude of out-of-field teaching requires a definition which specifies the certification areas that are considered valid for a given teaching field. Several sources were used to construct this definition. These sources include a report published in 1982 by the North Carolina Center for Public Policy Research, entitled "Teacher Certification: Out-of-Field Teaching in Grades 7-12 in N.C.". Other sources included tables on appropriate certification to teach mathematics and science, prepared by Patricia Weiss for the Mathematics and Science Education Network, and discussions with personnel from the State Department of Public Instruction.

The following charts provide a detailed description of the certification areas which were considered valid for teaching in a given field. Due to the complexity of the certification codes, many charts are required to describe this relationship adequately for all grades, K-12.

While the charts are extensive,they may be described rather briefly as follows. In grades K-6, an elementary certificate for

a particular grade range allows a teacher to teach any subject in that range of grades. For example, an early childhood certificate (K-4) would allow one to teach any subject in each of those grades. In addition, there are some areas which are certified at the K-12 level (music, dance, etc). A certificate in one of these areas is considered sufficient to allow one to teach that subject at any grade level. Finally, some areas, such as mathematics and science, require certification at the middle grades or secondary level. Therefore, in grades 7-9, a teacher is counted as properly certified if that teacher holds a middle grades certificate in the field being taught. Similarly, in grades 9-12 a teacher is counted as properly certified only if he or she holds a secondary certificate in the field being taught. Note that due to the overlap of certification areas for ninth grade, either a middle grades or secondary certificate in the subject area is valid for teaching that subject.

As a final consideration, note that except for one area, computer education, endorsements[1] in a subject area are counted as out-of-field for that subject. It seems likely that when a school encounters a shortage of teachers in a particular subject, one method of dealing with the shortage would be to employ persons who hold endorsements in that area. Since the purpose of this report is to examine likely shortage areas, the inclusion of endorsements as valid certifications would obscure the measure of out-of-field teaching as an indicator of shortage.

[1] Endorsements permit persons to teach less than one-half of their total course load in a field for which they lack full certification.

KINDERGARTEN CERTIFICATION CHART

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	EARLY CHILDHOOD (00023)	ENGLISH AS A 2ND LANGUAGE (00110)	READING (00190)	MUSIC (00800)	DANCE (00805)	ART (00810)	THEATER (00108)	COMPUTER EDUCATION (00079, 18079)	PHYSICAL EDUCATION (00090)	HEALTH EDUCATION (00097)	HEALTH SPEC. (00098)
ENGLISH/ LANGUAGE ARTS	X	X									
READING	X		X								
MUSIC	X			X							
ART	X					X					
THEATER, DANCE & OTHER CULT. ART	X				X		X				
COMPUTER EDUCATION	X							X			
PHYSICAL EDUCATION	X								X		
HEALTH	X									X	X
SELF-CONTAINED & ALL OTHERS	X										

FIRST THROUGH THIRD GRADE CERTIFICATION CHART

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	ELEMENTARY (00020), PRIMARY (00021) EARLY CHILDHOOD (00023)	ENGLISH AS A 2ND LANGUAGE (00110)	READING (00190)	MUSIC (00800)	DANCE (00805)	ART (00810)	THEATER (00108)	COMPUTER EDUCATION (00079, 18079)	PHYSICAL EDUCATION (00090)	HEALTH EDUCATION (00097)	HEALTH SPEC. (00098)
ENGLISH/ LANGUAGE ARTS	X	X									
READING	X		X								
MUSIC	X			X							
ART	X					X					
THEATER, DANCE & OTHER CULT. ART	X				X		X				
COMPUTER EDUCATION	X							X			
PHYSICAL EDUCATION	X								X		
HEALTH	X									X	X
SELF-CONTAINED & ALL OTHERS	X										

FOURTH GRADE CERTIFICATION CHART

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	ELEMENTARY (00020), PRIMARY (00021) GRAMMAR (00022) EARLY CHILDHOOD (00023), INTER. (00024)	ENGLISH AS A 2ND LANGUAGE (00110)	READING (00190)	MUSIC (00800)	DANCE (00805)	ART (00810)	THEATER (00108)	COMPUTER EDUCATION (00079, 18079)	PHYSICAL EDUCATION (00090)	HEALTH EDUCATION (00097)	HEALTH SPEC. (00098)
ENGLISH/ LANGUAGE ARTS	X	X									
READING	X		X								
MUSIC	X			X							
ART	X					X					
THEATER, DANCE & OTHER CULT. ART	X				X		X				
COMPUTER EDUCATION	X							X			
PHYSICAL EDUCATION	X								X		
HEALTH	X									X	X
SELF-CONTAINED & ALL OTHERS	X										

FIFTH GRADE CERTIFICATION CHART

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	ELEMENTARY (00020), GRAMMAR (00022) INTERMEDIATE (00024)	ENGLISH AS A 2ND LANGUAGE (00110)	READING (00190)	MUSIC (00800)	DANCE (00805)	ART (00810)	THEATER (00108)	COMPUTER EDUCATION (00079, 18079)	PHYSICAL EDUCATION (00090)	HEALTH EDUCATION (00097)	HEALTH SPEC. (00098)
ENGLISH/ LANGUAGE ARTS	X	X									
READING	X		X								
MUSIC	X			X							
ART	X					X					
THEATER, DANCE & OTHER CULT. ART	X				X		X				
COMPUTER EDUCATION	X							X			
PHYSICAL EDUCATION	X								X		
HEALTH	X									X	X
SELF-CONTAINED & ALL OTHERS	X										

SIXTH GRADE CERTIFICATION CHART

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	ELEMENTARY (00020), GRAMMAR (00022) INTERMEDIATE (00024), ANY MIDDLE GRADES (78:000)	ENGLISH AS A 2ND LANGUAGE (00110)	READING (00190)	MUSIC (00800)	DANCE (00805)	ART (00810)	THEATER (00108)	COMPUTER EDUCATION (00079, 18079)	PHYSICAL EDUCATION (00090)	HEALTH EDUCATION (00097)	HEALTH SPEC. (00098)
ENGLISH/ LANGUAGE ARTS	X	X									
READING	X		X								
MUSIC	X			X							
ART	X					X					
THEATER, DANCE & OTHER CULT. ART	X				X		X				
COMPUTER EDUCATION	X							X			
PHYSICAL EDUCATION	X								X		
HEALTH	X									X	X
SELF-CONTAINED & ALL OTHERS	X										

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SEVENTH AND EIGHTH GRADE MATH/SCIENCE/SOCIAL STUDIES CERTIFICATION CHART *

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	MATH (78200)	SCIENCE (78300)	BUSINESS EDUCATION (78600)	COMPUTER EDUCATION (18079)	SOCIAL STUDIES (78400)
MATH	X				
COMPUTER EDUCATION	X		X	X	
ALL SCIENCE FIELDS		X			
ALL SOCIAL STUDIES FIELDS					X

* In addition, any middle grades science area is sufficient for all science teaching fields, and any middle grades social studies area is sufficient for all social studies teaching fields.

SEVENTH AND EIGHTH GRADE ENGLISH/FOREIGN LANGUAGE CERTIFICATION CHART

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	LANGUAGE ARTS (78180 or 00180)	READING (78190 or 00190)	ENGLISH AS A 2ND LANGUAGE (78110 or 00110)	FRENCH (78510)	SPANISH (78520)	GERMAN (78530)	RUSSIAN (78580)	LATIN (78590)
ENGLISH/ LANG. ARTS	X		X					
READING		X						
FRENCH				X				
SPANISH					X			
GERMAN						X		
OTHER FOREIGN LANGUAGE				X	X	X	X	X

SEVENTH AND EIGHTH GRADE CULTURAL ARTS/HEALTH/P.E. CERTIFICATION CHART

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	ELEMENTARY (00020), GRAMMAR (00022)	MUSIC (78800 or 00800)	ART (78810 or 00810)	DANCE (78805 or 00805)	THEATER ARTS (78108 or 00108)	PHYSICAL EDUCATION (78090 or 00090)	HEALTH EDUCATION (78097 or 00097)	HEALTH SPEC. (78098 or 00098)
MUSIC	X	X						
ART	X		X					
THEATER, DANCE & OTHER CULT. ART	X			X	X			
PHYSICAL EDUCATION	X					X		
HEALTH	X					X	X	X
SELF-CONTAINED & OTHER TEACHING	X	ANY MIDDLE GRADES CERTIFICATION AREA						

NINTH THROUGH TWELFTH GRADE MATH/SCIENCE CERTIFICATION CHART *

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	MATH (00200)	SCIENCE (00300)	EARTH SCIENCE (00302)	PHYSICAL SCIENCE (00303)	BIOLOGY (00310)	PHYSICS (00320)	CHEMISTRY (00330)	BUSINESS EDUCATION (00600)	COMPUTER EDUCATION (18079)
MATH	X								
COMPUTER PROG.	X							X	X
COMPUTER EDUCATION	X							X	X
PHYSICAL SCIENCE		X	X	X		X	X		
BIOLOGY		X			X				
CHEMISTRY		X					X		
PHYSICS		X				X			
GENERAL SCIENCE		X	X	X	X	X	X		

* In addition to the certification areas listed, ninth grade would also include the middle grades certification (78:000) for each of the subject areas listed.

NINTH THROUGH TWELFTH GRADE ENGLISH/FOREIGN LANGUAGE CERTIFICATION CHART *

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	ENGLISH (00100)	FRENCH (00510)	SPANISH (00520)	GERMAN (00530)	RUSSIAN (00580)	LATIN (00590)	LANGUAGE ARTS (78180)	READING (00190)	ENGLISH AS A 2ND LANGUAGE (00110)	SPEECH (00109)
ENGLISH/ LANG. ARTS	X						X		X	
SPEECH										X
READING								X		
FRENCH		X								
SPANISH			X							
GERMAN				X						
RUSSIAN					X					
LATIN						X				
OTHER FOREIGN LANGUAGE		X	X	X	X	X				

* In addition to the certification areas listed, ninth grade would also include the middle grades certification (78:000) for each of the subject areas listed.

NINTH THROUGH TWELFTH GRADE SOCIAL STUDIES CERTIFICATION CHART *

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	SOCIAL STUDIES (00400)	POLITICAL SCIENCE (00405)	GEOGRAPHY (00410)	HISTORY (00420)	ECONOMICS (00431)	SOCIOLOGY (00432)	ANTHRO. (00433)
POLITICAL SCIENCE	X	X			X		
GEOGRAPHY	X		X				
HISTORY	X			X			
ECONOMICS	X				X		
SOCIOLOGY	X					X	
OTHER SOCIAL STUDIES	X	X	X	X	X	X	X

* In addition to the certification areas listed, ninth grade would also include the middle grades certification (78:000) for each of the subject areas listed.

NINTH THROUGH TWELFTH GRADE CULTURAL ARTS/HEALTH/P.E. CERTIFICATION CHART *

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	MUSIC (00800)	DANCE (00805)	ART (00810)	THEATER ARTS (00108)	PHYSICAL EDUCATION (00090)	HEALTH EDUCATION (00097)	HEALTH SPEC. (00098)	DRIVER EDUCATION (00096)
MUSIC	X							
ART			X					
THEATER, DANCE & OTHER CULT. ART		X		X				
PHYSICAL EDUCATION					X			
HEALTH					X	X	X	
DRIVER EDUCATION								X
SELF-CONTAINED & OTHER TEACHING	ANY K-12 OR 9-12 SUBJECT AREA CERTIFICATION. (IN NINTH GRADE, ANY MIDDLE GRADES CERTIFICATION AREA.)							

* In addition to the certification areas listed, ninth grade would also include the middle grades certification (78:000) for each of the subject areas listed.

VOCATIONAL EDUCATION CERTIFICATION CHART

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	AGRICULTURE (00700), AGRI. TECH. (00701)	HOME ECONOMICS (00710)	HEALTH OCCUPATIONS (00720)	MARKETING & DIST. EDUCATION (00730)	TRADE PREP. PROGRAMS (00740)	INTRO. TO TRADE (00744)	INDUSTRIAL COOP. TRAINING (00745)	VOC. BUSINESS EDUCATION (00760)	HANDICAP. (00770), DISADVAN.	PRE-VOC. EDUCATION (00777)	INDUS. ARTS (00820)	JUNIOR ROTC (00999)	BUS. ED. (00600), BASIC BUS (00601)
AGRICULTURE	X												
BUSINESS EDUCATION								X					X
HOME ECONOMICS		X											
MARKETING				X									
TRADE AND INDUSTRY					X	X	X						
HEALTH OCCUPATIONS			X										
PRE-VOCATIONAL										X			
INDUSTRIAL ARTS											X		
VOCATIONAL HANDICAPPED AND DIS-ADVANTAGED									X				
OTHER VOCATIONAL	X	X	X	X	X	X	X	X	X	X	X	X	X
JUNIOR ROTC												X	

EXCEPTIONAL CHILDREN CERTIFICATION CHART

CERTIFICATION AREAS (AND CODES)

TEACHING FIELD	CROSS CATEGORICAL (88001)	SEVERELY HANDICAPPED (88002)	MENTALLY HANDICAPPED (88081)	SPEECH IMPAIRED (88082)	VISUALLY IMPAIRED (88083)	PHYSICALLY HANDICAPPED (88084)	EMOTIONALLY HANDICAPPED (88085)	SPECIFIC LEARNING DISABILITY (88086)	ACADEMIC. GIFTED (88087)	HEARING IMPAIRED (88088)	HOSPITALIZED /HOMEBOUND (88089)
MENTALLY HANDICAPPED	X		X								
SPEECH IMPAIRED				X							
ACADEMICALLY GIFTED									X		
EMOTIONALLY HANDICAPPED	X						X				
HOMEBOUND/ HOSPITALIZED											X
LEARNING DISABLED	X							X			
PHYSICALLY HANDICAPPED						X					
HEARING IMPAIRED										X	
VISUALLY IMPAIRED					X						
OTHER EXCEPTIONAL CATEGORIES	X	X	X	X	X	X	X	X	X	X	X

APPENDIX B

Correspondence between PPAR Teaching Areas and CPC First Choice Certification Areas

One data problem which must be addressed involves the definition of what constitutes an out-of-field teaching assignment. Appendix A specifically describes the certification areas which would allow a teacher to be counted as "in-field" for any given teaching assignment.

In addition, a classification scheme must be developed which will allow for comparisons between the supply of teachers and the demand for teachers in each of many specific teaching fields. Unfortunately, the current data systems in use on both the supply and the demand sides do not always allow for easy comparisons.

On the demand side, teachers may be classified according to the certification which they hold, or by the classes which they will be hired to teach. Indeed, since teachers are hired to teach specific classes, this report uses the fields in which teachers are needed as the basis of the classification system on the demand side. However, the potential number of different classes is quite large; therefore, many different classes were grouped together to form what is referred to in the report as "PPAR teaching fields". For example, many different specific course titles are included in the Political Science teaching field. Decisions on these groupings were made by Task Force staff in consultation with the State Department of Public Instruction. The resulting classification scheme is presented in

left-hand side of the chart in this appendix. It is used throughout the report.

As discussed in Chapter III, the traditional measure of supply is the number of degrees conferred in different education subdisciplines. However, this measure suffers from at least three limitations, two of which would result in an under count and one which would overstate the supply of new teachers. As noted in Chapter III, the net effect of all three is unknown.

Fortunately, the CPC data system does not suffer from these limitations. In addition, the CPC system allows potential teachers to be classified according to their first choice certification area. Each possible certification area can then be assigned to one, and only one, teaching field. This allows a direct comparison of demand and supply for each teaching area. For example, the number of potential teachers with biology certificates can be compared to the demand for biology teachers. Each certification area is used for only one teaching field, so that each person is counted only once. The certification areas assigned to each teaching field are listed on the right-hand side of the chart in this appendix. Throughout the report, this methodology is used to compare supply and demand numbers for each teaching field.

The reader should note that this is not a perfect classification system. There are at least two reasons for this statement. First, as shown in Appendix A, it is possible for a teacher with one certification area to teach in more than one teaching field. However, if this person were counted in more

than one teaching field on the supply side, it would overstate supply in many fields. Second, many teachers and potential teachers receive certification in more than one area. In order to avoid an over count of supply, such persons must be grouped into single teaching fields. In this study, that field was determined by having them identify their first choice certification area.

CORRESPONDENCE BETWEEN PPAR TEACHING FIELDS AND CPC FIRST CHOICE CERTIFICATION AREAS

PPAR TEACHING FIELDS	CERTIFICATION AREAS
ELEMENTARY	
K THRU 3	EARLY CHILDHOOD (00023)
4 THRU 6	INTERMEDIATE (00024)
K-12 SUBJECT AREAS	
SPEECH	SPEECH (00109), MIDDLE GRADES SPEECH (78109)
READING	READING (00190)
MUSIC	MUSIC (00800), MIDDLE GRADES MUSIC (78800)
ART	ART (00810), MIDDLE GRADES ART (78810)
THEATER ARTS/DANCE/OTHER	THEATER ARTS (00108), DANCE (00805), MIDDLE GRADES (78108, 78805)
HEALTH/PHYSICAL ED.	PHYSICAL EDUCATION (00090), HEALTH ED. (00097), HEALTH SPEC. (00098), MIDDLE GRADES (78090, 78097)
DRIVER EDUCATION	DRIVER EDUCATION (00096)
MIDDLE GRADES/SECONDARY (7-12)	
ENGLISH	ENGLISH (00100), MIDDLE GRADES LANGUAGE ARTS (78180)
MATH/COMPUTER ED.	MATH (00200), MIDDLE GRADES (78200)
SCIENCE	
BIOLOGY	BIOLOGY (00310)
CHEMISTRY	CHEMISTRY (00330)
PHYSICS	PHYSICS (00320)
GENERAL SCIENCE	SCIENCE (00300), EARTH SCIENCE (00302), PHYSICAL SCIENCE (00303), MIDDLE GRADES (78300)
SOCIAL STUDIES	
POLITICAL SCIENCE	POLITICAL SCIENCE (00405)
GEOGRAPHY	GEOGRAPHY (00410)
HISTORY	HISTORY (00420)
ECONOMICS	ECONOMICS (00431)
SOCIOLOGY	SOCIOLOGY (00432)
GENERAL SOCIAL STUDIES	SOCIAL STUDIES (00400), ANTHROPOLOGY (00433), MIDDLE GRADES (78400)
FOREIGN LANGUAGE	
FRENCH	FRENCH (00510), MIDDLE GRADES (78510)
SPANISH	SPANISH (00520), MIDDLE GRADES (78520)
GERMAN	GERMAN (00530), MIDDLE GRADES (78530)
LATIN	LATIN (00590), MIDDLE GRADES (78590)
OTHER FOREIGN LANGUAGE	RUSSIAN (00580),MIDDLE GRADES (78580)
OTHER MIDDLE GRADES/SECONDARY	BIBLE (00905)
VOCATIONAL EDUCATION	
AGRICULTURE	AGRICULTURE (00700), AGRICULTURE TECHNOLOGY (00701)
BUSINESS EDUCATION	BUSINESS ED. (00600, 78600), BASIC BUSINESS (00601), VOCATIONAL BUSINESS ED. (00760)
HOME ECONOMICS	HOME ECONOMICS (00710)
MARKETING	MARKETING AND DISTRIBUTIVE ED. (00730)
TRADE & INDUSTRY	TRADE PREP. PROGRAMS (00740), INTRO. TO TRADES PROGRAMS (00744), INDUSTRIAL COOP. TRAINING (00745)
HEALTH OCCUPATIONS	HEALTH OCCUPATIONS (00720)
PRE-VOCATIONAL	PRE-VOCATIONAL EDUCATION (00777)
INDUSTRIAL ARTS	INDUSTRIAL ARTS (00820)
VOCATIONAL HANDICAPPED	HANDICAPPED (00770), DISADVANTAGED (00780)
OTHER VOCATIONAL	
ROTC	JUNIOR ROTC (00999)
EXCEPTIONAL CHILDREN	
MENTALLY HANDICAPPED	MENTALLY HANDICAPPED (88081)
SPEECH IMPAIRED	SPEECH-LANGUAGE IMPAIRED (88082)
ACADEMICALLY GIFTED	GIFTED AND TALENTED (88087)
EMOTIONALLY HANDICAPPED	SEVERELY EMOTIONALLY HANDICAPPED (88085)
HOMEBOUND/HOSPITALIZED	
LEARNING DISABLED	SPECIFIC LEARNING DISABILITIES (88086)
PHYSICALLY HANDICAPPED	PHYSICALLY/ORTHOPEDICALLY HANDICAPPED (88084)
HEARING IMPAIRED	HEARING IMPAIRED (88088)
VISUALLY IMPAIRED	VISUALLY IMPAIRED (88083)
OTHER EXCEPTIONALITIES	CROSS CATEGORICAL (88001), SEVERELY/PROFOUNDLY HANDICAPPED (88002)